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MATERIA MEDICA,

FOR

THE USE OF STUDENTS.

BY

JOHN B. BIDDLE, M.D.,

PROFESSOR OF MATERIA MEDICA AND GENERAL THERAPEUTICS IN THE JEFFERSON MEDICAL COLLEGE, MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, FELLOW OF THE COLLEGE OF PHYSICIANS, ETC., ETC.

FOURTH EDITION, REVISED AND ENLARGED,

WITH ILLUSTRATIONS.

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PREFACE

TO THE FOURTH EDITION.

Although little more than two years have elapsed since the publication of the third edition of the *Materia Medica*, yet the improvements in pharmacological science have been so numerous during this period, that the addition of much new matter and a careful revision of the whole work have been made necessary in the present edition. Most of the articles have been modified, some of them have been re-written, and many new articles have been introduced, among which may be particularized: Chloral, Methylic Ether, Tetrabromide of Carbon, Pepsine, Oxalate of Cerium, Sulpho-Carbolic Acid and the Sulpho-Carbolates, Phosphuret of Zinc, Sambucus, the Bromides of Ammonium, Sodium, and Lithium, Phosphate of Ammonia, and Peroxide of Hydrogen. Some of these articles are of only recent introduction into the Materia Medica; all of them are now of such established reputation as to claim notice.

The illustrations of the book comprise, as in previous editions, representations of most of the important indigenous and naturalized plants, as well as diagrams of instruments employed in the atomization of liquids.

The author has aimed in this, as in previous editions, to pre-

sent a succinct account of the articles of the Materia Medica, in general use in the United States, and discussed in the courses of lectures delivered upon the subject, to which he trusts the work will be found, as heretofore, to furnish a suitable text-book. He takes pleasure in renewing his dedication of it to the gentlemen in attendance upon the various medical schools of North America.

PHILADELPHIA, December, 1870.

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MATERIA MEDICA.

THE agents employed in the treatment of diseases are denominated REMEDIES, and the branch of medicine which is devoted to their consideration is termed MATERIA MEDICA. Remedies may be divided into *Hygienic*, *Mechanical*, *Imponderable*, and *Pharmacological* agents.

HYGIENIC REMEDIES are usually treated of in works specially devoted to the subject.

PART I.

MECHANICAL REMEDIES.

MECHANICAL REMEDIES belong chiefly to Surgery. A few agents of this class are, however, employed in the practice of medicine, and are included in the Materia Medica. They are *bloodletting* (general and local), *setons*, *issues*, *bandages*, *friction*, and *acupuncture*.

1. GENERAL BLOODLETTING is performed principally by *venesection* or *phlebotomy*, which is usually practised on the median-cephalic or basilic veins of the arm—sometimes also on the external jugular and other veins. *Arteriotomy* is occasionally resorted to, on the temporal artery, in cerebral affections.

Bloodletting is employed, to moderate vascular excitement, reduce inflammatory action, relieve congestion, allay spasm and pain, relax the muscular system, promote absorption, and arrest hemorrhage; and for these purposes it is a most available therapeutical resource. So powerful and exhausting an agent is, however, always to be resorted to with caution and discrimination; is not to be unduly repeated, even in inflammatory cases; and is seldom or never proper in diseases of a typhoid tendency, or where a tubercular diathesis is suspected, or in extreme infancy and old age.

2. The Local Abstraction of Blood is practised by means of *leeches* and *cups*. The leech (*hirudo*) is an aquatic worm, common throughout Europe, America, and India. The European leech (*h. medicinalis*, termed also *sanguisuga officinalis*), is of a blackish or grayish green color on the back, from two to three or four inches in length, and is characterized by six longitudinal dorsal ferruginous stripes, the four lateral ones being interrupted or tesselated with black spots. The American leech (*h. decora*), is usually from two to three inches long, and is of a deep green color, with three longitudinal dorsal rows of square spots. Both the imported and indigenous leech are employed in this country, but the latter makes a smaller incision, and is preferable in infantile cases. When the discharge of blood from leech-bites is excessive, it may be arrested by pressure, by compresses of lint, the application of alum, creasote, solution of subsulphate of iron, and other styptics, or by touching the wounds with nitrate of silver; and if these means fail, the wounds may be sewed.

In the operation of *cupping*, cupping-glasses and a scarificator are employed. The removal of atmospheric pressure, by the application of glasses partially exhausted of air, produces a determination of blood to the capillaries of a part, and it is afterwards readily drawn by scarification. When blood is not abstracted, the operation is termed *dry cupping*, and is a valuable revulsive agent. The topical abstraction of blood by leeches and cut cups combines the advantages of depletion and

revulsion. Leeches are employed in external inflammations, in situations where cups are inadmissible, and in infantile cases. Cups are generally preferable in internal inflammations, from their more decided revulsive influence. When blood is drawn by leeches, its continued flow may be promoted by the application of warm fomentations to the wounds.

3. Setons (*Setacea*) and Issues (*Fonticuli*), are employed when a permanent counter-irritant effect is desired. A *seton* is established by passing through the integument a seton-needle, armed with a skein of silk; or, a piece of tape, or a strip of sheet lead may be used for the purpose. An *issue* is made with a cauterant, usually potassa; and after the slough has separated, a discharge is maintained by the introduction of an issue-pea, for which purpose a common dried pea is used, or a dried unripe Curaçoa orange, or a small round ball, made of Florentine orris-root.

4. Bandages are employed, in the practice of medicine, to promote the absorption of dropsical effusions. For the same purpose, strips of adhesive plaster may be applied to the chest, in chronic pleurisy and empyema, in the manner in which they are employed in the treatment of fractured ribs.

5. Frictions are useful as revellents, and as local stimulants. They may be employed either with the dry hand, or with horse-hair gloves, or with liniments.

6. Acupuncture consists in the introduction into the body of fine, well-polished, sharp-pointed needles. It is a useful remedy in rheumatism, neuralgia, local paralysis, &c., and is sometimes conjoined with electricity, when the operation is known as Electro-puncture.

PART II.

IMPONDERABLE REMEDIES.

Under this head are included *Light*, *Heat*, *Cold*, and *Electricity*.

1. Light (*Lux*), exercises an important influence in the organized world as a vivifying stimulus. It is useful as a therapeutic agent, in diseases dependent on imperfect nutrition and sanguification; and the exposure of the surface of the body to its action, as far as nudity is compatible with proper warmth, promotes the regular development and strength of the organs. On the other hand, in many diseases the action of light is injurious, and *darkness* is resorted to as a sedative and tranquilizing agent.

2. Heat (*Calor*), applied to the human system in moderate amounts, acts, both locally and generally, as an excitant; in intense degree, it destroys vitality and organization. It is employed as a *local* excitant and revulsive, by means of hot bottles, hot bricks, the hot foot-bath, &c., and as an application to painful and inflamed parts, in the form of poultices and fomentations. As a *general* application, heat is chiefly resorted to in the form of the water-bath and vapor-bath. The *warm bath*, at a temperature from 92° to 98° F., is used as a relaxant in dislocations, herniæ, spasm, infantile convulsions, croup, &c., and also for its action on the skin in rheumatic and chronic cutaneous affections. The *hot bath* has a temperature of from 98° to 112°, and is a powerful excitant in cases of exhaustion, asphyxia, or suffocation, and is employed also in old paralytic and rheumatic cases. The *hot air-bath*, at a temperature of from 98° to 130°, is useful as an excitant and revellent, and is

employed in cases of internal congestion, and in rheumatic, neuralgic, and cutaneous affections. The *hot vapor-bath* is adapted to the same class of cases as the hot air-bath, and exerts also a diaphoretic and relaxing influence.

The destructive agency of heat is resorted to for the purpose of *vesication*, as by the application to the skin of a metallic plate heated to 212° by immersion in boiling water; and of *cauterization*, by the employment of red-hot iron, or of moxa. Hot iron (known as the *actual cautery*), is used chiefly as a styptic. The term *moxa* is applied to small masses of combustible matter, which are burnt slowly in contact with the skin, with a view to a revulsive effect in deep-seated inflammations, nervous affections, &c.

3. Cold (*Frigus*).—The application of cold to living bodies produces a reduction of the temperature and volume of the part, with contraction of the bloodvessels and other tissues, and suspension of the secretions and exhalations. The application of excessive or prolonged cold is followed by the torpor and death of the part. When it is applied in moderation and for a short period, reaction generally takes place, with a return and even increase of temperature, volume, color and sensibility.

Cold is employed therapeutically, with a view to both its primary and secondary effects. The *primary* action of cold is used, 1. To lessen vascular and nervous excitement and preternatural heat, as by the use of cold lotions and spongings in fevers, the ice-cap in cerebral affections, the shower-bath in insanity, the bladder filled with ice to the spine in epilepsy, the ether spray to the spine in chorea, &c. 2. To constringe the tissues, promote the coagulation of the blood, and lessen the volume of parts; hence the local application of ice or cold water to abate inflammation, check hemorrhage, cure aneurism, and reduce strangulated hernia. 3. To produce local anæsthesia in surgical operations, by means of a freezing mixture topically applied.

The *secondary* effects of cold are obtained by the employ-

ment of a less intense degree of cold. They are resorted to, 1. To invigorate the system, as with the cold shower-bath and plunge-bath. 2. To rouse the system, as by cold affusions in coma and asphyxia. 3. To recall the vital properties to frost-bitten parts. 4. To effect local excitation, as by the application of the cold douche to rheumatic and paralyzed limbs.

Cold liquids and ice are taken into the stomach as refrigerants in fevers. They are introduced into the rectum and vagina, to check hemorrhage and allay irritation; and cold water, injected into the impregnated uterus, is among the most certain means of inducing premature delivery.

4. Electricity (*Electricitas*).—The electric current acts as an excitant to the nerves both of sensation and motion. It influences to some extent, also, the secretions, through its action on the nerves distributed to the secreting organs; it may promote the function of absorption, through an effect on the absorbents; and it affects the circulation, by inducing contractions of the heart. A powerful charge of electricity produces violent and frequently fatal effects on the central nervous system.

The various forms of electricity are resorted to for their stimulant effect in a number of nervous affections. It is chiefly used in cases of local and functional paralysis, which are independent of lesion of the nervous centres. It has also been employed with occasional good effect in amaurosis, nervous deafness, neuralgia, photophobia, chronic rheumatism, chorea, hysteria, and other neuroses, and to excite uterine contractions. From its influence on the secretions, it has been prescribed as an emmenagogue, to overcome constipation, to promote the biliary secretion, and to heal ulcers. It has been also resorted to with success to promote the absorption of tumors and indurations. In the form of electro-magnetism, it is a powerful excitant in the coma resulting from narcotic poisons, and in asphyxia generally, and is probably the most active remedy that can be exhibited in these cases.

For medicinal purposes, electricity is obtained from three sources:

1. *Friction*, as in the common electrical machine.
2. *Chemical action*, as in the voltaic battery.
3. *Magnetism*, either of temporary magnets, as in the coil machines, or of permanent magnets, as in the electro-magnetic machines.

PART III.

PHARMACOLOGICAL REMEDIES.

Pharmacological Remedies, or Medicines, are substances, not essentially alimentary, which, when applied to the body, so alter or modify its vital functions, as to be rendered applicable to the treatment of diseases.

The designation, Materia Medica, is, *strictly speaking*, limited to the consideration of medicines. The application of medicines to the treatment of diseases is termed Therapeutics. Pharmacy is the department of Materia Medica which treats of the collection, preparation, preservation, and dispensation of medicines.

To the student of medicine, the objects of examination in relation to medicines are,—the sources from which they are derived; the mode in which they are prepared and brought to market; their sensible qualities, and also their chemical composition and relations; their physiological effects, or the effects which they are capable of producing in healthy individuals; their therapeutical effects, or those which they produce in morbid states of the system; and lastly, the doses, modes of administration, and preparations (extemporaneous and officinal), under which they are administered.

To facilitate a uniform nomenclature and dispensation of medicines, authoritative works have been issued in different countries, termed Pharmacopœias. The Pharmacopœia of the United States was first promulgated by the authority of a convention held at Washington, in 1820; and it has been since revised decennially. It furnishes a list of articles which are in general use, sets forth the weights and measures which are employed in dispensing and preparing them, and supplies formulæ for such preparations as should be kept in the shops, and which are thence termed *officinal*, from the Latin word *officina*, a shop.

The effects of medicines take place either in the parts to which they are applied, or in distant parts of the system. The former are termed *local* or *topical effects;* the latter, *remote* or *constitutional effects.*

MODUS OPERANDI OF MEDICINES.

The medium through which the influence of medicines is exerted on remote parts of the body, or their *modus operandi* (as it is usually termed), was long a contested point. Until within a comparatively recent period, it was maintained that medicines and poisons transmitted their impressions from the parts receiving them to distant parts, by means of a *communication through the nerves.* But it is now generally admitted, that the *absorption* or passage of the medicinal or poisonous molecules into the blood is necessary to their action on parts remote from the seat of impression.

While, however, it is well established, that the *characteristic* action of medicines is transmitted to the parts influenced, exclusively through the medium of the circulation, it is undeniable that the functions of the nervous system may be *secondarily* excited by a local medicinal impression. The number of agents which operate in this manner is, however, very limited.

The action of medicines by absorption is proved by a variety of facts.

They are detected in many parts of the system, remote from that to which they have been applied, having been found in the blood, the solids, and the excretions, after being taken into the stomach. If the circulation be interrupted, the influence of a poison cannot be transmitted; while its effects have been obtained, when applied to a wound in the foot of an animal, after all parts of the extremity have been severed, except the artery and vein. In confirmation of the doctrine of absorption may be cited also the admitted facts, that the remote effects of medicines or poisons are promoted or retarded by circumstances which promote or retard absorption; that the blood of poisoned animals is found to possess poisonous properties; that the fluids and solids acquire medicinal properties after the use of medicines (as the milk of nurses); that the specific effects of medicines are produced by their injection into the blood; and that medicines disappear from closed cavities into which they are introduced.

After their absorption into the blood, medicines circulate with it, penetrate through the capillaries to the various organs, and are afterwards thrown out of the system with the excretions. Some medicines produce changes in the condition of the circulating fluid. Others have a specific action upon some one or other of the organs of the body. And in passing out of the system, most medicines act as stimulants to the organs by which they are thrown out.

The absorption of medicines is effected principally by the veins, and in some degree also by the lymphatics and lacteals. The medicinal particles penetrate or soak through the interstices of the tissue with which they are placed in contact, and are thence diffused through the circulation. To a limited extent, medicinal substances probably penetrate all the tissues of the part to which they are applied, and in this way the activity of medicines is most decided upon the organs contiguous to the seat of application.

The absorption of insoluble substances cannot take place

until they are previously rendered soluble. In the stomach, this is accomplished chiefly by the agency of the acids of digestion, lactic and muriatic.

It is objected to the theory of the operation of medicines by absorption, that certain poisons act with a rapidity incompatible with their previous introduction into the circulation. This is, however, not the fact, as the action of the most violent poisons (hydrocyanic acid, for example), is never wholly instantaneous; and careful experiments have shown that the velocity of the circulation is sufficient to diffuse a poison through the blood in a shorter space of time than its effects are ever observed on the system.

CIRCUMSTANCES WHICH MODIFY THE EFFECTS OF MEDICINES.

The circumstances which modify the effects of medicines relate both to the medicines and to the human system.

1. The properties of medicines are modified by the soil in which they grow, by climate, cultivation, age, and the season of the year at which they are gathered.

2. Medicines are more active, because more readily absorbed, in a state of solution than in a solid state.

3. Soluble medicines are often rendered inert by a chemical reaction which converts them into insolubles: in this way antidotes modify the effects of poisons.

4. Differences in dose greatly modify the effects of medicines.

5. Pharmaceutical modifications have an important influence on the efficacy of medicines. They may be exhibited in the solid, semi-solid, liquid, and aëriform states:

In the *solid* state they are administered in the shape of powders, pills, lozenges, and confections.

In the *liquid* state, they are administered in the shape of mixtures, solutions, medicated waters, infusions, decoctions, tinctures, spirits, wines, vinegars, syrups, honeys, and oxymels.

In the *semi-solid*, or soft state, they are applied externally,

in the form of liniments, ointments, cerates, plasters, and cataplasms.

In the form of *gases* and *vapors*, medicines are used for purposes of inhalation.

SOLIDS.

Powders (*Pulveres*). The form of powder is usually selected for the administration of medicines, which are not very bulky, nor of very disagreeable taste, which have no corrosive property, and which do not deliquesce rapidly on exposure. Deliquescent substances, and such as contain a large proportion of fixed oil, should always be recently pulverized, as they are liable to spoil when kept. Most substances, employed in the form of powder, are usually pulverized on a large scale. For the purpose of pulverizing drugs in small quantity, the physician makes use of a *pestle* and *mortar*, of iron, brass, glass, Wedgewood ware, or marble. Various means are resorted to, to facilitate the operation of powdering, and care should be taken to separate the inert portions and impurities.

The lighter powders may be administered in water or other thin liquid. The heavier powders require a more consistent vehicle, as syrup, treacle, or honey.

Pills (*Pilulæ*), are small globular masses, of a size that can be conveniently swallowed. The form of pill is suitable for the exhibition of medicines which are not bulky, and are of disagreeable taste or smell, or insoluble in water. Deliquescent substances should not be made into pills, and those which are efflorescent should be previously deprived of their water of crystallization.

Some substances are readily made into pills, with the addition of a little water or spirit. Very soft or liquid substances require the addition of some dry inert powder, as bread-crumb, or powdered gum Arabic, to reduce them to a proper consistence. Wax is a good excipient for oils.

Heavy powders are mixed with some soft solid, as conserve of roses, plasma, manna, &c., or with a tenacious liquid, as treacle, or syrup. When the pilular mass is properly prepared, it is rolled with a spatula into a cylinder of uniform thickness, and is then divided into the required number of pills, with the hand, or more accurately, with a pill-tile, or with a pill-machine. The pills are rolled into spherical form between the fingers; and, to prevent adhesion, are dusted with some dry powder, as powdered liquorice root or carbonate of magnesia. To conceal the taste and smell of pills, they are sometimes coated with gelatin, collodion, mucilage, sugar, &c. Pills, which have been long kept, may pass unchanged through the stomach and bowels, and are therefore objectionable.

Troches or Lozenges (*Trochisci*), are small, dry, solid masses, made of powders with sugar and mucilage, and intended to be held in the mouth and allowed to dissolve slowly. Mucilage of *tragacanth* is usually employed in preparing lozenges.

Confections (*Confectiones*), are soft solid preparations, made with some saccharine matter. They are subdivided into *Conserves* and *Electuaries:* the former consist of combinations of recent vegetable substances and refined sugar, beat into a uniform mass; the latter are extemporaneous mixtures of medicines, usually dry powders, with syrup, honey, or treacle.

LIQUIDS.

Mixtures (*Misturæ*), are preparations of *insoluble* substances, suspended in water by means of gum Arabic, sugar, the yolk of eggs, or other viscid matter. When the suspended substance is oleaginous, the mixture is termed an *emulsion.*

Solutions (*Liquores*), are solutions (chiefly aqueous) of

non-volatile substances, which are wholly soluble in the menstruum employed. In making solutions, and all other aqueous preparations, the water used should be fresh river, rain, or distilled water, and free from saline impurities.

Medicated Waters (*Aquæ*), are preparations consisting of water holding volatile or gaseous substances in solution. Many of them, having been made by distilling water from plants containing volatile oil, were formerly termed *distilled waters*. In place of distillation, trituration with carbonate of magnesia (afterwards separated by filtration) is now employed to impregnate water with volatile oils.

Infusions (*Infusa*), are partial solutions of vegetable substances in water, obtained without the aid of ebullition. They are made with both hot and cold water: the former extracts the soluble principle more rapidly and in larger proportion; the latter is preferred, when the active principle would be injured by heat, or when it is desirable not to take up some matter, insoluble at a low temperature. Infusions have been usually made by pouring water upon the substances to be infused, and allowing it to remain upon them for some time: when the process takes place at a heat of from 60° to 90°, it is termed *maceration;* when at a heat of from 90° to 100°, *digestion.* Of late years, a more efficient mode of extracting the medicinal virtues of plants has been introduced, termed *percolation.* In this operation, the medicinal substance is coarsely powdered, and placed in an instrument called a *percolator*, in the lower part of which is fitted a porous or colander-like partition or diaphragm. The powder is then saturated with water or other menstruum, till it will absorb no more; and, after they have remained for some time in contact, fresh portions of the menstruum are added, till the required quantity is employed. The fresh liquid, as it is successively added, percolates the solid particles of the medicinal substance, driving the previously saturated liquid before it; and in this way completely

exhausts the substance to be dissolved. An ordinary glass funnel answers very well for percolation; and a circular piece of muslin or lint, pressed into the neck by means of a cork with notched sides, forms a good diaphragm,—care being taken to interpose a similar piece of muslin, moistened slightly with the menstruum, between the diaphragm and powder.

Decoctions (*Decocta*), are partial solutions of vegetable substances in water, in which the active principles are obtained by ebullition. This is a more rapid and active mode of extracting the virtues of plants than by infusion. But it is objectionable, when the proximate principles are volatile at a boiling heat, or undergo decomposition by ebullition. In making decoctions, ebullition should be continued for a few minutes only, and the liquid should be allowed to cool slowly in a close vessel. As they are apt to spoil, they should be prepared only when wanted for use.

Tinctures (*Tincturæ*), are solutions of medicinal substances in alcohol or diluted alcohol. Ammonia and ethereal spirit are also sometimes employed as solvents; and solutions in these menstrua are called *ammoniated* tinctures and *ethereal* tinctures. Alcohol or rectified spirit (of a sp. gr. 0.835, according to the U. S. Pharmacopœia), is employed in making tinctures of substances nearly or quite insoluble in water, as the resins, essential oils, camphor, &c. Diluted alcohol or proof spirit (consisting of equal measures of officinal alcohol and water) is preferred, when the substance is soluble both in alcohol and water, or when some of its ingredients are soluble in the one menstruum and some in the other. Tinctures have been usually prepared by maceration or digestion, more commonly by the former process, and a period of two weeks is recommended for its duration. It should be conducted in well-closed glass vessels, which should be frequently shaken; and when the maceration is completed, the tincture should be separated from the dregs by filtration. The U. S. Pharmaco-

pœia now recommends percolation in making most tinctures, and, in the hands of skilful pharmaceutists, this process is preferable, as the most thorough mode of exhausting medicinal substances; but, where the operator cannot trust himself, it is better to recur to the old process of maceration. Tinctures should be kept in bottles accurately stoppered, to prevent evaporation, which might seriously increase their strength.

The form of tincture is adapted to the exhibition of medicines, which are to be given in small quantity, and it affords a convenient mode of graduating doses. In prescribing large and continued doses of tinctures, the stimulating effects of the alcohol which they contain must be borne in mind.

Spirits (*Spiritus*), are alcoholic solutions of volatile or gaseous principles, properly speaking procured by distillation, but now usually prepared by dissolving the volatile principles in alcohol or diluted alcohol. The spirits of the aromatic vegetable oils are used to give a pleasant odor and taste to mixtures, to correct the nauseating and griping effects of cathartics, and also as carminatives and stomachics.

Wines (*Vina*), are solutions of medicinal substances in Sherry or other white wine. They are more liable to decomposition than tinctures, and are of variable strength; but they are in some cases preferred from the less stimulating character of the menstruum, which has also sometimes an increase of solvent power from the acid which it contains.

Vinegars (*Aceta*), are infusions or solutions of medicinal substances in distilled vinegar or diluted acetic acid, which is a particularly good solvent of many vegetable principles, as the organic alkalies.

Honeys (*Mellita*), are preparations of medicinal substances in honey. In *oxymels*, a combination of honey and vinegar is employed. The latter preparations are not now much used.

Syrups (*Syrupi*), are preparations of medicinal substances in concentrated solutions of sugar. The term *syrup* (*syrupus*), or *simple syrup*, is applied to a solution of sugar (thirty-six troyounces) in water (Oij f℥xij), dissolved with the aid of heat. *Medicated* syrups are usually made by incorporating sugar with vegetable infusions, decoctions, expressed juices, fermented liquors, or simple aqueous solutions. They may also be prepared by adding a tincture to simple syrup, and afterwards evaporating the alcohol; or, by mixing the tincture with sugar in coarse powder, and dissolving the impregnated sugar, after evaporation, in the necessary proportion of water. Syrups are apt to be spoiled by heat, and should be made in small quantities at a time.

By the evaporation of the solutions of vegetable principles, a very useful class of preparations termed *Extracts* (*Extracta*), is obtained. They are prepared from infusions, decoctions, tinctures, and vinegars; and sometimes, in the case of recent vegetables, from the expressed juices of plants, usually diluted with water. Extracts prepared by the agency of water, are termed *watery extracts;* those by means of alcohol, *alcoholic extracts;* those by means of acetic acid, *acetic extracts.* The evaporation of extracts is generally continued, till they have a pilular consistence. Within a few years, however, these preparations have been employed in the liquid form, under the name of *Fluid Extracts* (*Extracta Fluida*), which have the advantage of convenience of administration, and of being prepared at a less degree of heat. They are more liable than the solid extracts to spontaneous decomposition; and this difficulty is usually counteracted by means of sugar. In making the fluid extracts, alcohol, diluted alcohol, and acetic acid are the menstrua resorted to. The portion of the solvent, which remains after evaporation, contributes in some degree to the preservation of the preparation. Under the name of *Juices* (*Succi*), the expressed juices of fresh plants, preserved by one-third of their bulk of alcohol, are occasionally used. Although officinal in the British Pharmacopœia, these are not, however, recognized by that of the United States.

The Oleoresins (*Oleoresinæ*), are extracts obtained by the agency of ether, which consist of fixed or volatile oils, holding resins and sometimes other active matters in solution. They retain a liquid or semi-liquid state, upon the evaporation of the liquid employed in their preparation, and have the property of self-preservation.

SEMI-SOLIDS.

Liniments (*Linimenta*), are oily preparations designed for external use, usually thicker than water, but always liquid at the temperature of the body.

Ointments (*Unguenta*), are preparations of a consistence like that of butter, made with lard or some other fatty substance. They are fitted for application to the skin by friction or inunction. Most of the ointments become rancid, when long kept, and it is therefore best to prepare them only as wanted for use. *Simple Ointment*, or *Ointment of Lard* (*Unguentum Adipis*), consists of one part of white wax and four parts of lard.

Cerates (*Cerata*), are made of oil or lard, mixed with wax, spermaceti, or resin, with the addition of various medicinal substances. They are of harder consistence than ointments, and do not melt when applied to the skin. *Simple Cerate*, or *Cerate of Lard* (*Ceratum Adipis*), consists of one part of white wax and two parts of lard.

Plasters (*Emplastra*), are adhesive at the temperature of the body, and must generally be heated to be spread. Some substances have sufficient consistence and adhesiveness to be made into plasters. Usually, however, medicinal substances when employed in this form, are mixed with *Lead Plaster* or *Litharge Plaster* (*Emplastrum Plumbi*), a compound of olive oil and litharge. Plasters are prepared for use by spreading them

upon sheepskin, linen, or muslin, with a margin a quarter or half inch broad.

Cataplasms, or Poultices (*Cataplasmata*), are soft, moist substances, intended for external use. The common emollient poultice, employed to relieve inflammation and promote suppuration, is made by mixing bread-crumbs with boiling milk, or powdered flaxseed with boiling water.

GASES AND VAPORS.

When employed in this form, medicines are administered by *inhalation*. This may be effected either by diffusing the gas or vapor through the air to be respired by the patient; or by inclosing it in a bag or bottle with a suitable tube, through which the patient may breathe; or, when ethereal vapors are employed, by saturating a sponge or handkerchief with the ether, and applying it to the mouth and nostrils of the patient; or the fumes of burning medicinal substances may be inhaled, by means of cigarettes or pipes, variously contrived.

WEIGHTS AND MEASURES.

In prescribing and dispensing medicines, the following are the *weights* and *measures* employed in the United States, with their signs annexed.

TROY OR APOTHECARIES' WEIGHT.

The pound, ℔	contains	Twelve ounces, ℥.
The ounce		Eight drachms, ʒ.
The drachm		Three scruples, ℈.
The scruple		Twenty grains, gr.

The term *pound* should be avoided in formulas, owing to the danger of mistakes from confounding the troy pound with the heavier avoirdupois pound, and large weights should be expressed in *troyounces*.

WINE MEASURE.

The gallon, C	contains	Eight pints, O.
The pint		Sixteen fluidounces, f℥.
The fluidounce		Eight fluidrachms, f℥.
The fluidrachm		Sixty minims, ♏.

Liquid measures are sometimes prescribed by *drops*, which, however, vary in quantity according to the nature of the liquid, the shape and size of the vessel from which it is dropped, and even the amount of liquid which the vessel contains. Approximate measurements are also frequently employed in prescribing the less powerful liquids: thus a *teacup* is used for f℥iv, or a gill; a *wineglass* for f℥ij; a *tablespoon* for f℥ss; a *teaspoon* for f℥j.

A variety of circumstances, relating to the human organism, modify the effects of medicines.

Age exerts a most important influence in this particular. Children are more susceptible than adults; and, in advanced age, also, smaller doses are required than in the prime of life. No general rule can be laid down for the adaptation of the doses of medicines to different ages, as the different susceptibilities to the influence of different medicines are unequal at the same age. Thus, infants are peculiarly alive to impressions from opium, while, in the cases of calomel and castor oil, they will bear much larger proportional doses.

Dr. Young's scheme for graduating the doses of medicines to different ages answers very well in prescribing: "For children under 12 years, the doses of most medicines must be diminished in the proportion of the age to the age increased by 12; thus, at two years to $\frac{1}{7}$, viz.: $\frac{2}{2+12}=\frac{1}{7}$. At 21, the full dose may be given."

Sex, *temperament*, and *idiosyncrasy*, all modify the effects of medicines. Women require somewhat smaller doses than men; and during menstruation, pregnancy, and lactation, all active treatment, which is not imperatively demanded, should be avoided. To persons of a sanguine temperament, stimulants are to be administered with caution, while in cases of nervous

temperament, the same care is to be observed in the employment of evacuants. Mercurials are called for where the bilious temperament exists, but on the other hand they are generally injurious where the lymphatic temperament is strongly marked. Idiosyncrasy renders many individuals peculiarly susceptible or insusceptible to the action of particular medicines, as mercury, opium, &c.

Habit diminishes the influences of many medicines, especially narcotics; and not a few *diseases* produce a remarkable insusceptibility to medicinal action.

The influence of *race*, *climate*, *occupation*, and the *imagination* upon the effects of medicines is often decided, and deserves attention in prescribing.

PARTS TO WHICH MEDICINES ARE APPLIED.

Medicines are applied to the skin, to mucous membranes, to serous membranes, to wounds, ulcers, cysts, and abscesses, and they are injected into the veins.

1. *To the Skin.*—Medicines are applied to the skin for both a local and a general effect. As their influence on *distant* organs is the result of their absorption, this function is usually assisted by friction, or by removal of the cuticle, when medicines are applied to the skin to effect remote parts of the system.

The application of medicines to the skin by *friction* is occasionally resorted to, but its results are slow and uncertain; and, when we wish to affect the system through the agency of the skin, the preferable method is to apply the medicine to the dermis denuded of the cuticle.

This is termed the *endermic method*, and the cuticle is usually removed by means of a blister. The medicine is applied to the denuded dermis in the form of a powder, or, if very irritating, it may be incorporated with gelatine, lard, or cerate. This method is useful in case of irritability of the stomach, of inability to swallow, or where we desire to influence the system rapidly, and by every possible avenue, or where it is of importance to apply the medicine near the seat of disease. The dose

is to be two or three times the amount which is administered by the stomach.

Another method of applying medicines through the skin, is by injection into the subcutaneous cellular tissue. This method is termed the *hypodermic* method, and is of recent introduction into therapeutics. Medicines are injected hypodermically, for both a local and a general effect. A constitutional impression can be produced by this means much more rapidly and efficiently than by the introduction of medicines into the stomach. It is particularly adapted to the speedy relief of pain, to the treatment of diseases, in which it is desirable to influence the system with the greatest possible rapidity and effect, and also to cases where the internal administration of medicines is interfered with. The substances proper for hypodermic injection, are those which are small in bulk and are of ready solubility, such as the vegetable alkaloids. Substances of imperfect solubility should not be injected hypodermically, dangerous results having followed therefrom, as from the use of the salts of quinia. The dose, particularly in first injections, should be one half the ordinary dose by the stomach, and for females about a third. The instrument used for injection is a small syringe, armed with a small, sharp lancet, and for the better regulation of the dose, it is desirable that the syringe should be graduated. When a constitutional effect only is aimed at, a good spot for injection is at the insertion of the deltoid muscle in the arm, and where repeated operations are practised, it is well to vary the point of injection.

2. *To Mucous Membranes.*—Medicines are applied to all the gastro-pulmonary and genito-urinary mucous surfaces.

a. To the *conjunctiva*, they are applied for local effects only, and are termed *collyria*, or eye-washes.

b. To the *nasal* or *pituitary membrane*, they are applied usually for local purposes; sometimes, however, to irritate, and excite a discharge, when they are termed *errhines;* sometimes, also, to produce sneezing, with a view to the expulsion of foreign bodies from the nasal cavities, when they are termed *sternutatories.*

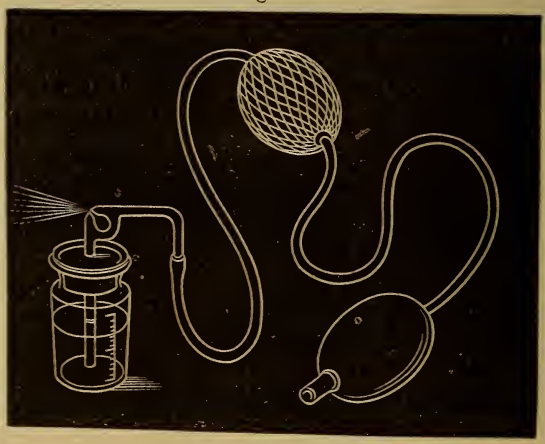
c. To the *mucous membrane of the mouth and throat*, medicines are applied almost exclusively for local purposes. When in solution, they are termed *gargarismata* or *gargles*. Powders are introduced by insufflation.

d. To the *Eustachian tubes*, washes are applied in local affections.

e. On the *aërial* or *tracheo-bronchial membrane*, medicines produce a very decided influence, both local and general. Liquid substances are introduced into the air passages by means of a sponge or syringe, in the treatment of chronic inflammations of the larynx. Various substances are inhaled with advantage in phthisis, chronic bronchitis and laryngitis, asthma, &c., while the most powerful effects are produced on the system by the absorption of ethereal vapors and gases through the pulmonary surface.

Within the last few years, liquids have been introduced into the air-passages, for the treatment of diseases of the respiratory organs, in the form of a *fine spray*. This mode of application, termed the *pulverization*, *nebulization*, or *atomization* of fluids, has proved very valuable, particularly in the

Fig. 1.

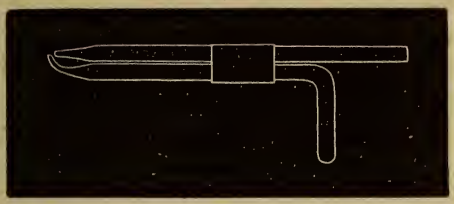


relief of throat affections. Various instruments have been resorted to in the atomization of liquids. The *hand-ball atomizer*, which is usually employed, consists of two glass tubes,

with capillary openings, placed at right angles to each other, the vertical tube being dipped in a bottle containing the fluid to be atomized, while at the other end it is close to and about opposite to the centre of a capillary opening in the horizontal tube. This connects with an elastic tube, intercepted by two elastic balls, one in the middle, the other, which is furnished with the valves, at the end of the tube. The upper ball acts as a reservoir, into which a current of air is forced from the lower ball by pressure with the hand. The air in the vertical glass tube being rarified, the liquid rises to the capillary opening, and is there pulverized by the current of air from the horizontal tube. The *atomizer* is used also to produce local anæsthesia, and as a deodorizer.

As modified by Winterich, the spray can be readily gener-

Fig. 2.



ated within various parts of the body, as the back of the throat, nostril, meatus of the ear, &c. Instead of air, steam has been substituted as the forcing power in the apparatus known as Siégle's. In this instrument, as modified by Da

Fig. 3.

Costa, inhalation can be practised without fatigue or assistance, and the warmth of the spray is also an advantage in many diseases of the respiratory organs.

f. The *gastro-intestinal mucous membrane*, of all parts of

the body, is most employed for the exhibition of medicines. The stomach, from its great susceptibility, its active absorbing power, and the numerous relations which it has with almost every part of the body, is the chief recipient of medicinal agents. The rectum is, however, also frequently employed for various purposes, as to relieve disease of this or of neighboring organs, to occasion revulsion, to produce alvine evacuations, to destroy ascarides, and when for any reason it is desirable to spare the stomach.

It is usually recommended, that the dose of medicines, introduced into the rectum for constitutional effects, should be two or three times greater than when taken into the stomach. In the case of active, soluble medicines, however, especially narcotics, it is most prudent to give the same amount by the rectum as by the mouth.

Solid substances introduced into the rectum are termed *suppositories;* they are best made with cocoa butter. Liquids introduced into the rectum are termed *clysters*, *lavements*, *injections*, and *enemata*. Soluble substances, when thus applied, are usually dissolved in water; insoluble substances are suspended in some mucilaginous vehicle. When the enema is to be retained, it should be from one to four fluidrachms in quantity. When it is introduced to act upon the bowels, its bulk may be from twelve to sixteen fluidounces for an adult, six to eight fluidounces for a youth of twelve, three to four fluidounces for a child of one to five years, and a fluidounce for a newly-born infant. Various instruments are used for the administration of enemata, as the pipe and bladder, the ordinary syringe, the self-injecting apparatus, and the elastic bottle and tube. Gaseous matters have also been thrown into the rectum —tobacco-smoke, for example,—to relieve obstructions of the bowels.

g. To the *urino-genital* and *vagino-uterine membranes*, applications are made exclusively for local purposes. Within a few years, intra-uterine medication has been a good deal employed in local affections of the uterus, but, in the injection of fluids into the uterus, there is danger of peritonitis.

3. To *Serous Membranes.* Irritating solutions are injected into the cavity of the tunica vaginalis testis, in hydrocele; into the hernial sac, in hernia; and even into the pleural cavity, in pleurisy, for the purpose of producing adhesion of the sides of the sacs.

4. To *Ulcers*, *Wounds*, and *Abscesses*, medicines are applied chiefly for their local effects. The absorbing power of these surfaces is to be kept in mind in such applications. *Cysts* are sometimes cured by injections, as of iodine into cysts of the thyroid gland.

5. *The injection of medicines into the Veins* has been occasionally practised. The operation is, however, objectionable, from the danger of introducing air into the circulation; and it is seldom resorted to, except in the case of *transfusion of blood* after uterine hemorrhage.

THE CLASSIFICATION OF MEDICINES.

In treating the articles of the Materia Medica, some writers have classified them according to their natural properties, others according to their action on the human system. To the student of medicine, a classification based upon the sensible qualities or natural affinities of medicines can be of little value, since it associates articles of the most opposite remedial properties. A classification of medicines founded on a similarity of action on the animal economy is more desirable and useful, and various arrangements of the Materia Medica have been attempted on this basis. They are all, to some extent, necessarily imperfect, owing partly to the diversified effects of medicines, and partly to our ignorance of the real nature of many of the modifications which they produce upon the tissues. Still, the advantages of some arrangement of this kind are so numerous, that it cannot well be dispensed with.

The following classification will be found to include the more ordinary and generally received divisions of the Materia Medica, and to present the articles in convenient groups for therapeutic application.

Medicines may be divided into—

I. Those which have a special action on the nervous system, or *Neurotics* (from νευρον, a nerve).
- Narcotics,
- Anæsthetics,
- Antispasmodics,
- Tonics,
- Astringents,
- Stimulants,
- Sedatives,
- Spinants.

II. Those which have a special action on the secretions, or *Eccritics* (from εκκρισις, secretion).
- Emetics,
- Cathartics,
- Diaphoretics,
- Diuretics,
- Blennorrhetics,
- Emmenagogues.

III. Those which modify the blood, or *Hæmatics* (from αιμα, the blood).
- Hæmatinics,
- Alteratives,
- Antacids.

IV. Those which act topically.
- Irritants,
- Demulcents,
- Coloring Agents,
- Anthelmintics.

CLASS I.—NEUROTICS.

ORDER I.—NARCOTICS.

Narcotics (from *ναρκεω, to stupefy*), are medicines which impair or destroy nervous action. The primary effect of narcotics is, however, of a stimulant character, and their therapeutic efficacy is in a great degree due to this action. They are often administered, too, for a true narcotic or sedative influence on the motor, sensor, and intellectual functions. In diseased conditions, a marked *tolerance* of this class of medicines is established, and they can be exhibited in large doses without inducing narcosis. They are employed, chiefly, to remove muscular spasm, relieve pain, allay cerebral or spinal irritability, and procure sleep.

When employed to relieve pain, they are termed *anodynes;* when employed to procure sleep, *hypnotics* or *soporifics.*

When this class of medicines is resorted to for any length of time, with a view to a *narcotic* effect, their influence upon the system is much diminished, and constantly increased amounts are called for, to maintain the same effect.

OPIUM.

Opium (from *οπος, juice*), is the CONCRETE JUICE of the unripe capsules of Papaver somniferum (*Nat. Ord.* Papaveraceæ). The opium poppy is a native of Persia, but is cultivated in various parts of Asia, in Europe, and in the United States. It is an annual plant, with a round, leafy stem, from two to four feet or more in height, and large four-petaled flowers. There are two prominent varieties of this species: the *black* poppy, with violet-colored or red flowers, brown or blackish seeds, and globular capsules; and the *white* poppy, with white flowers and seeds, and ovate capsules; but these varieties run into each other under cultivation.

The RIPE CAPSULES (PAPAVER) are from an inch and a half to two inches or more in diameter, and contain a good deal of

opium. They are sometimes given to children in the form of *syrup*, and are applied externally as an anodyne emollient, in the form of *decoction*. The seeds are destitute of narcotic properties, and are used in Europe as an article of diet, and for the manufacture of an oil.

Opium is obtained from incisions in the half-ripe capsules. The juice, which exudes from the incisions, is scraped off after drying, generally with more or less of the epidermis, and is sometimes sent into the market unmixed, as a choice variety. The opium of commerce is, however, commonly made by adding the dried juice, obtained by incision, to an extract prepared from a decoction of the leaves, the whole being kneaded together, formed into cakes, and wrapped in fresh poppy leaves.

The commerce of the United States is supplied with opium almost exclusively from Asiatic Turkey. This is known in the market as *Smyrna* or *Turkey* opium, and comes in irregularly rounded or flattened cakes, covered with the capsules of a species of Rumex.

A large amount of opium is produced in British India, for consumption in India and China, but it is not found in our markets. The Persian opium is another variety, but it does not reach the United States. Much opium was formerly obtained from Upper Egypt, in the neighborhood of Thebes, but its production was for a long time abandoned, though within the last thirty years again introduced. Successful attempts have been made with the cultivation of the poppy in England and other parts of Europe, which have resulted in the production of opium. During the civil war in the United States, a good deal of opium was made in the Southern States, from poppies of almost every variety; samples of this opium have yielded about the same amount of morphia as that obtained from Turkey opium, and, even in New England, very good opium has lately been produced. The great source of our supply of opium has, however, long been, and still is, the Turkish dominions.

The best opium should have a fine chestnut colour, an aro-

matic, strong, peculiar smell, and a dense consistence—becoming, however, harder and darker by being kept. It should be moderately ductile, break with a deeply notched fracture, and, when drawn across white paper, should leave an interrupted stain. The taste is very bitter and somewhat acrid, and when chewed it excites irritation in the mouth and throat. It is inflammable, and imparts its virtues to water, alcohol, and diluted acids—but not to ether.

Chemical Constituents.—Opium contains a great variety of chemical constituents, the most important of which is the alkaloid MORPHIA, which exists chiefly in combination with an acid called *meconic.* Other principles found in opium are the alkaloids, *narcotina*, *codeia*, *narceia*,—paramorphia, papaverina, opiania, cryptopia, meconin, thebolactic acid, porphyroxin, gum, extractive, resin, oil, &c., and, in very minute amounts, alkaloids, termed meconidia, laudamia, codamia, pseudomorphia, apomorphia, lanthopia, rhœadinia, and rhœagenia. Morphia is the principle upon which the narcotic effects of opium essentially depend, and, with its salts, is officinal in all the pharmacopœias.

Narcotina ($C_{46}H_{25}NO_{14}$) exists in opium, chiefly in the free state, and, being insoluble in water, is left behind when the drug is macerated in this menstruum. It occurs in white, tasteless, inodorous, needle-like crystals, which are soluble in ether. At one time it was thought to possess a portion of the narcotic properties of opium, but it is now admitted to be inert in this respect. Its salts have been used in India as febrifuge tonics, in the treatment of intermittent fevers.

Codeia ($C_{35}H_{20}NO_5$) exists in opium combined like morphia with meconic acid, and is extracted in the process for obtaining the latter alkaloid, from which it may be separated by an alkaline solution, which dissolves the morphia and leaves the codeia. It has been found to possess narcotic powers, with an especial direction to the great sympathetic nerve, and has been used in gastrodynia and dyspepsia, in the dose of half a grain or more. It is, however, too expensive an article for general use.

Narceia is obtained from the mother liquor left after crys-

tallizing out the salts of morphia. It has been asserted that it possesses valuable medicinal properties, but experience in the United States has not confirmed the statements made in Europe as to its efficacy.

Paramorphia, known also as *thebaia*, has been lately said to be a tetanizing toxic agent, analogous in its effects to strychnia.

Papaverina is said to produce some soporific action, with a sedative influence on the pulse; its strength is from one-eighth to one-fourth of that of morphia.

Cryptopia is thought to produce an hypnotic influence, analogous to that of morphia, though a much feebler agent. The action of the derivative alkaloids of opium, must, however, be considered as a still unsettled subject, with the exception of that of morphia.

Incompatibles.—Alkalies, and astringent infusions containing tannic acid, are incompatible with opium; the former precipitate morphia from its soluble combination, while the latter form with it an insoluble compound. Many of the mineral salts are also decomposed by opium, as the acetate of lead, (meconate of lead and acetate of morphia being formed when these articles are prescribed together).

Tests.—*T. of the chloride of iron* strikes a red color with meconic acid; *nitric acid* colors morphia red; *sesquichloride of iron* colors it dark blue; *iodic acid* colors it reddish brown, and, if starch is added, forms a blue compound; *ammonia* precipitates it from solution; and *tannic acid* forms with it an insoluble precipitate.

Physiological Effects.—When taken in a medicinal dose, opium at first moderately excites the circulation, increases the temperature of the skin, and agreeably exhilarates the intellectual functions. The stage of excitement is, however, of short duration. The pulse soon sinks below the normal standard, susceptibility to external impressions is diminished, the faculties of the mind become confused, and consciousness is finally lost in sleep. All the secretions are diminished, except that of perspiration, which is heightened; muscular contraction is lessened; and in some persons nausea and vomiting are pro-

duced; occasionally an itching and miliary eruption of the skin occur.

When a poisonous dose is taken, the stage of excitement is wanting; giddiness and stupor rapidly come on, with diminution in the frequency, though not in the fulness of the pulse; and these symptoms are soon followed by an irresistible tendency to sleep, and finally by coma. The breathing is heavy and stertorous, the pulse slow and oppressed, and the *pupils are contracted.* If relief is not afforded, the pulse sinks, the muscular system becomes relaxed, and death ensues, preceded sometimes in children by violent convulsions.

In cases of poisoning from opium or its preparations, the stomach should be immediately evacuated by the stomach-pump, if possible, or by emetics. The direct emetics are best for this purpose, as the sulphate of zinc (20 to 30 grains), or the sulphate of copper (5 to 10 grains). A large teaspoonful of mustard-flour, or a tablespoonful of powdered alum, answers very well as an emetic. Every means should be taken to arouse the patient from his lethargy; cold affusions, counter-irritation to the nape of the neck and extremities, flagellation to the palms of the hands and soles of the feet, and, best of all, when the coma is profound, the *electro-magnetic battery*, constitute our chief resources in this emergency. Artificial inflation of the lungs is also to be practised. The use of strong coffee has proved efficacious; and stimuli may be used to support the system. Of late years, it has been found that belladonna exercises a powerful influence as a physiological antidote against narcotism from opium, and the administration of this substance by the stomach, or, still better, the hypodermic injection of a solution of atropia, is one of the most available remedies that can be employed in poisoning from opium. The poisonous action of opium appears to be entirely directed to the nervous system, no local lesions being found after death.

Opium is largely used as an habitual narcotic in Oriental countries, and to some extent in Europe and the United States. The effects of indulgence in this species of intoxication are of

the most destructive character upon both the physical and mental faculties.

Medicinal Uses.—Of all the articles of the Materia Medica, opium enjoys the widest range of therapeutic application. From its properties of assuaging pain and inducing sleep, it is useful in almost all diseases; and it is positively contraindicated only where there is a tendency to apoplexy or coma, or where there exists an idiosyncrasy with respect to its effects. As an *anodyne* in painful and malignant ulcers and severe injuries, we have no substitute for opium; and, as an *hypnotic* in mania-a-potu, and in the wakefulness and cerebral irritability of fever, mania, &c., it is equally invaluable. From its power of relaxing muscular spasm, it is our most efficient resource in tetanus, colic, and spasm of the stomach, bowels, biliary ducts, ureters, neck of the bladder, &c. In dysentery and cholera it forms the basis of every variety of treatment, partly for its diaphoretic effects, but principally for its action in arresting both the secretions and peristaltic motion of the bowels. For the relief of the cough of pulmonary affections, opium has no equal in the Materia Medica. In cerebro-spinal meningitis and in puerperal fever, it has been found more successful than any other remedy. In gastric irritability, colica pictonum, peritonitis, rheumatism, gout, neuralgia, typhus, gangrene, convulsive diseases, diabetes, &c., it is also constantly employed.

Administration.—The ordinary dose of opium as an anodyne and hypnotic is one grain. Much larger doses are, however, called for in many diseases; and when it is administered for a length of time, as a narcotic, the dose must be gradually increased. To infants and very old persons, it is to be given with great caution.

Opium is administered in the form of *powder* or *pill.* It is easily powdered when thoroughly dried, and the pills, as well as all the other preparations of opium, should always be made from the powder. The powder is sometimes used endermically, and is sprinkled on irritable ulcers. In the form of *suppositories* it is also applied to the rectum.

The following are the officinal preparations of opium:

PILULÆ OPII (*Pills of Opium*). *Sixty grains* of opium, made into sixty pills, with *twelve grains* of soap. Each pill contains a grain of opium. They are kept in the shops, as hard old opium pills are sometimes preferred in cases of irritable stomach.

PILULÆ SAPONIS COMPOSITÆ (*Compound Pills of Soap*). *Sixty grains* of opium made into a pilular mass, with *half a troyounce* of soap. Useful for the administration of small doses. One grain of opium is contained in five of the mass.

CONFECTIO OPII (*Confection of Opium*). Opium beaten up with honey and spices (opium, 270 grains, aromatic powder, 6 troyounces, and clarified honey, 14 troyounces). Dose, gr. xxxvj.

EXTRACTUM OPII (*Extract of Opium*). Made by evaporating the aqueous solution. Dose, gr. $\frac{1}{2}$.

TROCHISCI GLYCYRRHIZÆ ET OPII (*Troches of Liquorice and Opium*). Much used in Philadelphia under the name of *Wistar's cough lozenges*. Made with opium, half a troyounce, liquorice, gum arabic, and sugar, each 10 troyounces, and oil of anise, a fluidrachm. The mass is to be divided into troches, each weighing six grains. Each troche contains about one-tenth of a grain of opium.

EMPLASTRUM OPII (*Opium Plaster*). Made by mixing extr. opium, a troyounce, with three fluidounces of water, and evaporating to a fluidounce and a half; and adding this to Burgundy pitch, 3 troyounces, and plaster of lead, 12 troyounces, previously melted together.

PULVIS IPECACUANHÆ COMPOSITUS (*Compound Powder of Ipecacuanha*). This powder, well known under the name of *Dover's Powder*, is made by rubbing up *sixty grains* of opium and ipecacuanha each, with *a troyounce* of sulphate of potassa, the salt being employed to promote the minute division and thorough intermingling of the opium and ipecacuanha. Dover's powder is a most valuable anodyne diaphoretic, extensively prescribed in diarrhœa, dysentery, rheumatism, bronchi-

tis, pneumonia, &c. Dose, gr. x, containing gr. j of opium and ipecacuanha each.

Tinctura Opii (*Tincture of Opium*). *Laudanum.* Prepared by macerating *two troyounces and a half* of powdered opium for three days in a pint of water, then adding a pint of alcohol, and after three days of further maceration, introducing the whole into a percolator, and adding diluted alcohol until two pints of tincture are obtained. This is the most commonly employed of all the officinal preparations of opium. When long kept, particularly if exposed to the air, it becomes thick from evaporation of the alcohol, and its strength is much increased. Dose, ♏xiij, or 25 drops, equivalent to a grain of opium. There are 120 drops in f℥j. Laudanum is much used in the form of enema.

Tinctura Opii Camphorata (*Camphorated Tincture of Opium*). *Paregoric Elixir.* Prepared by macerating *sixty grains* of opium in diluted alcohol Oij, with benzoic acid, *sixty grains*, oil of anise, *a fluidrachm*, clarified honey, *two troyounces*, and camphor, *forty grains*. Dose, f℥ss, or a tablespoonful, containing rather less than a grain of opium. A favorite preparation for children. 5 to 20 drops may be given to an infant.

Tinctura Opii Deodorata (*Deodorized Tincture of Opium*) contains the same proportion of opium as laudanum. In preparing it, a liquid watery extract of opium is first made, which is then washed with ether. The ether is afterwards separated, the residue dissolved in water, and mixed with enough alcohol to preserve it. *Two troyounces and a half* of opium are macerated with *half a pint* of water and expressed; the operation is twice repeated with the same quantity of water; the expressed liquids are mixed, and the mixture is evaporated to *four fluidounces*, and shaken, when cold, with *half a pint* of ether; the ethereal solution, when it has separated by standing, is poured off, and the remaining liquid is evaporated, until all traces of the ether have disappeared; this is mixed with *twenty fluidounces* of water and filtered; water enough is added to make the filtered liquid measure *a pint and*

a half; lastly, *half a pint* of alcohol is added, and the liquids are mixed together. The narcotina as well as the odorous and many other injurious ingredients of opium are thus got rid of. A new but valuable preparation. Dose, the same as that of laudanum.

TINCTURA OPII ACETATA (*Acetated Tincture of Opium*). Prepared by macerating *two troyounces* of opium, in vinegar, f℥xij, and alcohol Oss. Dose, ♏x, or 20 drops.

ACETUM OPII (*Vinegar of Opium*). *Black Drop.* Prepared by macerating powdered opium, *five troyounces*, nutmeg, *a troyounce*, saffron, *one hundred and fifty grains*, sugar, *eight troyounces*, in a pint of diluted acetic acid, and afterwards percolating with the same menstruum, till two pints are obtained. Black drop is twice the strength of laudanum, and is to be given in half the dose of that preparation.

VINUM OPII (*Wine of Opium*). *Sydenham's Laudanum.* Prepared by macerating *two troyounces* of opium in Sherry wine Oj, with cinnamon and cloves. Dose, the same as that of laudanum.

MORPHIA AND ITS PREPARATIONS.—Morphia exists in opium chiefly in combination with meconic acid. The meconate of morphia is separated from the other constituents of the drug, by successive macerations in water. Alcohol and solution of ammonia are then added to the watery solution, by which the salt is decomposed, the ammonia precipitating the morphia, and the alcohol seizing the coloring matter as soon as it is separated from the alkali. The crystals of morphia, which are formed, are afterwards boiled in alcohol, and the solution is filtered through animal charcoal.

Morphia ($C_{34}H_{19}NO_6$) occurs in colorless rhombic crystals, which are inflammable and dissipated by heat. It is without smell, but very bitter; scarcely soluble in water, ether, or chloroform, but soluble in boiling alcohol. From its *insolubility*, it is not employed medicinally, except in combination with acids.

MORPHIÆ SULPHAS (*Sulphate of Morphia*), MORPHIÆ ACETAS (*Acetate of Morphia*), MORPHIÆ MURIAS (*Muriate of Mor-*

phia), are the officinal salts of morphia, made by saturating the alkali with sulphuric, acetic, and muriatic acids. They are all freely soluble in water, and produce analogous medicinal effects, the sulphate being, however, most employed in this country. The salts of morphia possess the anodyne, hypnotic, antispasmodic, and diaphoretic properties of opium, and are considered less apt to produce headache and nausea, or other unpleasant effect. They are peculiarly adapted to the *hypodermic* and *endermic* methods of application. Dose, one-sixth to one-fourth of a grain. A *Solution of the Sulphate of Morphia* is officinal, and is much prescribed (*Liquor Morphiæ Sulphatis*). It contains one grain to f℥j of water. Dose, f℥j–ij. The bimeconate of morphia has also been employed.

CHLORAL.

This interesting compound, although discovered by Liebig in 1832, has attracted attention as a therapeutic agent, only since the statements of Liebrich, a physician of Prussia, published in May, 1869. It is prepared by passing dried chlorine gas through pure anhydrous alcohol, afterwards heating with concentrated sulphuric acid, the crude chloral which is separated being rectified over lime: the chlorine takes the place of hydrogen, in the alcohol, and forms also hydrochloric acid. Thus, $C_4H_6O_2+8Cl=C_4Cl_3O+HO$ (*Choral*)$+5HCl$. Anhydrous chloral is a limpid, oily, colorless liquid, with a fatty taste and a strong caustic smell, producing lachrymation. It has a sp. gr. of 1.502, a boiling point of 203°F., and mixes in all proportions with water, alcohol, and ether. With water it combines to form a HYDRATE, which crystallizes in snow-white needles, very soluble in water; and as pure chloral readily undergoes decomposition, the more stable hydrate is the form which is employed for medicinal use. It is incompatible with the alkalies.

Effects and Uses.—Chloral, in doses of from 20 to 40 grains, is a most reliable hypnotic (second only to opium in this particular), with no influence on the secretion from the bowels, and

a slight diuretic action. Its effect in relieving pain and spasm is often marked, though less constant than its hypnotic influence. The pulse is usually reduced in frequency under its use. Generally, no unpleasant effects follow its employment, though occasionally slight headache and even nausea supervene. It is asserted that chloral is decomposed in the blood, with the liberation of chloroform, but this is scarcely probable, and its effects are certainly not identical with those of chloroform.

Chloral has been found a very valuable hypnotic remedy in all the forms of insomnia, in hysterical excitement, in acute mania, and in delirium tremens. As an anodyne, in neuralgia, gastralgia, and colic, especially lead-colic, it has been also used with advantage. In delirium tremens, and many causes of insomnia, frequent doses are often required to induce sleep, and less than 20 grains will not produce any hypnotic influence.

Chloral is administered only in aqueous solution, and the addition of mucilage or syrup, particularly of the syrup of orange-peel will disguise its unpleasant taste. It is not well adapted to the hypodermic method, as painful phlegmons sometimes follow its use.

LACTUCARIUM.

Lactucarium (sometimes called *lettuce-opium*), is the CONCRETE JUICE of Lactuca sativa, the Garden Lettuce (*Nat. Ord.* Cichoraceæ), and is obtained from incisions in the plant, in the stem, during the period of inflorescence. Another and inferior mode of procuring it is by expression and evaporation of the expressed juice. Two varieties are found in the market: *English lactucarium*, which occurs in small, irregular lumps, of a reddish-brown color externally, and of an opiate smell, and a bitter, unpleasant taste, and *German lactucarium*, (which is inferior), in four-sided pieces, from an inch to an inch and a half thick, with one side convex and the three other sides flat, the convex surface darkish-brown, and the flat surfaces light yellowish-brown. An active principle termed *lactucin* is said to have been isolated. Lactucarium, prepared from

the juice of the Lactuca elongata, American or wild lettuce, has been found to possess effects similar to those of the officinal article.

Effects and Uses.—Lactucarium possesses the *anodyne* and *hypnotic* qualities of opium with a slight sedative action on the circulation, but it is an uncertain preparation. It may be given where opium disagrees, from idiosyncrasy in the patient. Dose, gr. x. The *syrup* is the most eligible form of administration. It is made by rubbing a troyounce of lactucarium with sufficient diluted alcohol, to bring it to a syrupy consistence, then percolating with diluted alcohol till half a pint of tincture has passed, afterwards evaporating to two fluidounces, and finally mixing the tincture with fourteen fluidounces of syrup. Dose, two or three fluidrachms.

BELLADONNA.

Belladonnæ Folium, Belladonna Leaf; Belladonnæ Radix, Belladonna Root.

Atropa Belladonna, or Deadly Nightshade (*Nat. Ord.* Solanaceæ), is a European perennial plant, with herbaceous, branched, downy stems, about three or four feet high, large ovate leaves, of a dull-green color, and drooping, bell-shaped, purple flowers. The whole plant possesses narcotic properties, but the LEAVES and ROOT only are officinal. When fresh, the leaves have an unpleasant smell, and a sweetish, subacrid, slightly nauseous taste. When dried they retain this taste, but have scarcely any odor. The dried root is long, round, from one to several inches in thickness, branched, of a reddish-brown color, of little odor, and a feeble, sweetish taste.

The narcotic properties of belladonna depend on the presence of an alkaloid termed *atropia*, which is found in all parts of the plant. It is officinal, and is prepared from the root, by exhaustion with alcohol, afterwards adding sulphuric acid, precipitating with potassa, dissolving the atropia in chloroform, and then evaporating the chloroform. *Atropia* ($C_{34}H_{23}NO_6$) is a white, crystalline, odorless substance with a bitter, acrid taste,

soluble in alcohol and ether, more so in chloroform, and partially soluble in water. It is a most energetic poison, producing analogous effects to those of belladonna, but much more powerful. Latterly, atropia has been a good deal employed medicinally as a substitute for belladonna, on account of its greater certainty. The dose to begin with for internal use is about one-thirtieth of a grain in solution. As a collyrium, to *dilate the pupil*, a solution of a grain in four fluidrachms of water, with a few drops of acetic acid, may be employed, and a drop of the solution applied to the eye. A tincture (atropia gr. j, diluted alcohol f℥ss) is used for the same purpose—dose for internal use, 8 drops. A *sulphate of atropia* and an ointment are also employed.

Physiological Effects of Belladonna.—In small doses the effects of belladonna are those of an anodyne narcotic, with little or no action on the circulation, or on any of the secretions, except a peculiar dryness of the mouth and throat. In larger doses it causes *dilatation of the pupils*, loss of vision, giddiness, constriction of the throat, difficulty of deglutition and articulation, marked diuresis, nausea, with occasional vomiting and purging, and sometimes a red eruption. When excessive doses are taken, these symptoms are aggravated, and terminate in maniacal delirium, coma, syncope, and death, often preceded by convulsions. Dissections show that the action of the poison is not confined to the cerebro-spinal system, but that it is attended by inflammation of the digestive organs. Cases of poisoning from belladonna are to be treated by evacuation of the stomach, cathartics, and, if coma occurs, by the electro-magnetic battery. Opium may be given as a physiological antidote, or hypodermic injections of solutions of the salts of morphia may be administered. Lime-water and the alkaline solutions have been found useful. Applied to the eyebrow, belladonna causes dilatation of the pupil.

Medicinal Uses.—Belladonna is one of our most highly-esteemed anodyne and antispasmodic remedies. It is destitute of hypnotic effect, and, on the contrary, has a tendency to occasion wakefulness. In the treatment of neuralgia it ranks

at the head of the narcotics, and is extensively employed both alone and in combination with the sulphate of quinia. It should be given until dryness of the throat, dilatation of the pupil, and some disorder of vision are produced. Its powers of allaying spasm have been found very efficacious in the treatment of whooping-cough and asthma. As a discutient of cancerous indurations, it has enjoyed some reputation, but any good effects in these cases, have probably been owing to an anodyne and not a resolvent influence. In mania, and many diseases of the cerebro-spinal system, especially epilepsy, it has been occasionally employed with advantage. Its action on the kidneys renders it useful in chronic Bright's disease; and by its influence in relieving irritability of the bladder, it is probably the best remedy for the nocturnal incontinence of urine of children. In constipation, iritis, and as a prophylactic against scarlatina, it is also resorted to. As a preventive of scarlatina, it was originally proposed from its power of affecting the throat and skin, and respectable authority is not wanting in confirmation of its efficacy in this particular. It is used, too, in cases of poisoning by opium.

As a topical remedy, belladonna is employed principally *to produce dilatation of the pupil* in operations for cataract, iritis, and prolapsus iridis. It is applied in the form of extract or ointment to the eyebrows, temple, or conjunctiva, and produces dilatation in a few minutes. The topical application of belladonna is also resorted to with advantage to relieve rigidity of the os uteri in labor.

Administration.—The dose of the *powder* of the root or leaves is gr. j, to be repeated and increased till dryness of the throat, dilatation of the pupil, and dimness of vision are produced. It is most frequently exhibited in the form of *extract* (or inspissated juice) of the leaves. Dose, $\frac{1}{4}$ to $\frac{1}{2}$ a grain, to be repeated and increased. The *tincture* (four troyounces of the leaves to diluted alcohol Oij—dose, 15 to 30 drops) and the *alcoholic extract* are also officinal. For external use, a plaster (*Emplastrum Belladonnæ*), made by mixing *a troyounce* of the extract and *two troyounces* of melted resin plaster, and an

ointment (*Unguentum Belladonnæ*), made by rubbing sixty grains of the extract first with water *half a fluidrachm*, and then with lard, *a troyounce*, are employed.

STRAMONIUM.

Stramonii Folium, Stramonium Leaf; Stramonii Semen, Stramonium Seed.

Fig. 4.

Datura Stramonium, or Thorn Apple, sometimes called Jamestown weed (*Nat. Ord.* Solanaceæ), is an annual indigenous plant, which grows very abundantly in waste grounds in all parts of the world. It has a forked, branching stem, from three to six feet high, ovate, toothed leaves, large funnel-shaped white or purplish flowers, which appear in midsummer, and ovate capsules, filled with numerous kidney-shaped, brownish-black seeds. The odor of the plant is strong and disagreeable, and its taste bitter and nauseous. It loses these properties very much when dried, but the process does not appear to weaken its narcotic qualities. The LEAVES and SEEDS are officinal, but the seeds are most powerful from containing most daturia.

The active principle of Stramonium is an alkaloid termed

daturia, which possesses properties analogous to those of atropia.

The *physiological effects* of stramonium are closely allied to those of belladonna, with a more marked action on the secretions. From its common occurrence in every part of the country, cases of poisoning from this weed are very frequent, particularly with children, who are fond of swallowing the seeds. The treatment laid down for the relief of poisoning from belladonna is applicable to these cases.

The *medicinal uses* of stramonium are similar to those of belladonna. It is prescribed internally in neuralgia, whooping-cough, mania, and epilepsy; and in spasmodic asthma the leaves have been smoked with great relief. The practice is, however, dangerous in aged or apoplectic persons. Topically, stramonium is used by oculists to *dilate the pupils* and diminish the sensibility of the retina to light; and it is an excellent anodyne application, in the form of cataplasm and ointment, to inflammatory tumors, irritable ulcers, bed sores, and hemorrhoids.

Administration.—The dose of the *powdered leaves* is gr. ij; of the *seeds*, a grain, to be repeated and gradually increased till narcotic effects are produced. Dose of the *extract of the leaves* (an inspissated juice), and of the *alcoholic extract*, gr. j, to commence with. The *tincture* (*four troyounces* of the seeds to diluted alcohol Oij, dose 20 to 40 drops), and the *ointment* made by mixing the extract with lard (according to the formula for ointment of belladonna), are also officinal.

HYOSCYAMUS—HENBANE.

Hyoscyami Folium, Henbane Leaf; Hyoscyami Semen, Henbane Seed.

Hyoscyamus niger, or Henbane (*Nat. Ord.* Solanaceæ), is a native of Europe, and is naturalized in the northern parts of the United States. It grows to the height of about two feet, with large, sinuated, pale-green leaves, and flowers of a straw-yellow color. The whole plant has narcotic properties; but the

LEAVES and SEEDS only are officinal. Henbane should be gathered when in flower; and, when fresh, has a strong, offen-

Fig. 3.

sive narcotic odor, and a mucilaginous, unpleasant, slightly acrid taste; but it loses most of these qualities in drying. The seeds are of a yellowish-gray color, with something of the odor of the plant, and have an oleaginous, bitter taste. The active properties of the plant depend upon a peculiar alkaloid principle, termed *hyoscyamia*, nearly identical in its action with atropia, but more soluble in water.

Effects and Uses.—The effects of henbane on the system much resemble those of belladonna. They differ from those of opium in their comparatively feeble hypnotic effect, and in their relaxing influence on the bowels. In large doses it causes *dilatation of the pupil*, delirium, loss of vision, &c. In cases of poisoning, the same treatment is to be pursued as for bella-

donna and stramonium. Henbane may be used remedially, in the same diseases, as belladonna and stramonium, than which it is, however, less active. It has been administered also, from the earliest days, to palliate cough, where opium is objectionable from its constipating or nauseating influence. Externally, it is employed in the form of cataplasm or fomentation to painful swellings and ulcers; and it may be used to dilate the pupil, in the same manner as belladonna.

Dose of the powdered leaves, gr. v to gr. x; of the seeds, somewhat less. The *extract* (an inspissated juice of the leaves) is the preferable form of administration; it is of a dark olive color, and extremely variable quality. Dose, gr. v to gr. x. *Tincture* (four troyounces to diluted alcohol Oij), dose f℥j. An *alcoholic extract* and a *fluid extract* (dose 10–20 drops), are also officinal.

TABACUM—TOBACCO.

Nicotiana Tabacum, or Virginian tobacco (*Nat. Ord.* Solanaceæ), is a native of the warm countries of America, but is now extensively cultivated in most parts of the world. It is an annual plant, growing to the height of from three to six feet, with large, oblong, pointed, hairy, pale-green leaves, and light-greenish, funnel-shaped flowers, expanding above into rose-colored segments. The DRIED LEAVES are the portion used. They have a yellowish-brown color, a strong, peculiar, narcotic odor, and a bitter, nauseous taste. The darker-colored leaves are the strongest.

The virtues of tobacco are imparted to alcohol and water, and depend on the presence of an alkaloid called *nicotia* ($C_{10}H_{17}N$), which is found in all parts of the plant. It is a colorless, oily, volatilizable, alkaline liquid, highly soluble in water, alcohol, ether, and chloroform, of a feeble odor, when cold, but irritant, when heated, of an acrid, burning taste, and is a most energetic poison. From the dried leaves are also obtained a concrete volatile oil, termed *nicotianin*, which is probably the odorous principle of the plant, and an *empy-*

reumatic oil, which gives the peculiar smell to old tobacco pipes. Both of these principles are poisonous.

Physiological Effects.—On persons unaccustomed to its use, tobacco, in small doses, produces a slight sedative action, with nausea, swimming in the head, increased flow from the kidneys, and sometimes, also, from the bowels. In larger doses, it induces vomiting and purging, a sensation of sinking at the pit of the stomach, giddiness, disorder of vision, the pupils, however, being little affected, depression of the circulation, great relaxation of the muscular system, coldness of the surface, and other symptoms of prostration; and, when excessive doses have been taken, these symptoms become more violent, and are followed by convulsions, paralysis, coma, and death. Cases of poisoning are to be treated on the principles applicable to other cases of narcotic poisoning; the diffusible stimuli are to be freely given.

The habitual use of tobacco as an exhilarant is well known. When taken to excess, it frequently develops disorders of the stomach, heart, and nervous system.

Medicinal Uses.—Tobacco is employed in medicine, chiefly with a view to its action on the muscular system—its anodyne and hypnotic properties being relatively feeble. In various spasmodic diseases, particularly in colic, ileus, strangulated hernia, constipation from spasmodic constriction, tetanus, spasm of the neck of the bladder and the glottis, and asthma, it is a remedy of great value. It has been also successfully applied to the treatment of poisoning by strychnia. Internally, tobacco is to be employed with caution, as it occasionally acts with dangerous energy. Stupes of an infusion of tobacco, (half an ounce to a pint of water), have been found an efficacious application to wounds, in cases of traumatic tetanus.

Administration.—Tobacco is not given by the stomach, owing to its emetic properties. It is usually administered by the rectum, in the form of *infusion* (℥j—Oj of boiling water, one-third to be given at a dose,) or tobacco-smoke may be introduced into the rectum. It may also be smoked for medici-

nal effect, or applied locally in the form of cataplasm. *Ointment of Tobacco* (*Unguentum Tabaci,*) is made by mixing a watery extract, prepared from *half a troyounce* of finely powdered tobacco, with *eight* troyounces of lard; it is a useful application to indolent ulcers and some cutaneous affections, particularly tinea capitis. The *Wine of Tobacco* (*Vinum Tabaci*) is made by macerating a *troyounce* of tobacco in a pint of Sherry wine for seven days; it is occasionally used as a diuretic—dose 20–30 drops. The *Oil* (*Oleum Tabaci,*) is sometimes mixed with ointments.

LOBELIA.

Lobelia inflata, or Indian tobacco (*Nat. Ord.* Lobeliaceæ,) is a very common annual or biennial indigenous plant, growing to the height of from six inches to two feet, with a fibrous root, an erect, hairy stem, ovate, serrated leaves, pale-blue flowers, and ovoid, inflated capsules. It flowers from July till the appearance of frost, and should be gathered about August and September. All parts of it are active, but the LEAVES and CAPSULES are most so. It has an unpleasant smell, and, when chewed, an acrid, burning, nauseous taste, which is at first faint, but soon becomes excessive. Water and alcohol extract the virtues of lobelia, which contain a volatile alkaloid principle, *lobelina*, analogous to nicotia.

Physiological Effects.—Lobelia produces effects on the system analogous to those of tobacco, acting in small doses as a sedative, nauseant, diuretic, and diaphoretic; in larger doses as an energetic emetic; and in still larger doses as an active acro-narcotic poison, resembling tobacco in its influence. It was employed by the aborigines, and has always been a popular empirical remedy.

Medicinal Uses.—Lobelia is sometimes classed among emetics, but its action in this particular is too violent for its safe administration. It is chiefly employed, by regular practitioners, with a view to its antispasmodic properties, for the relief of asthma, angina pectoris, and cardiac dyspnœa, and is given

in small doses, gradually increased, until headache or nausea ensue. It may also be used as an enema, to fulfil the same indications as tobacco.

Fig. 6.

Administration.—Lobelia is given in substance, tincture, and infusion. The dose of the *powder* as an antispasmodic, is gr. j to gr. iij; as an emetic, gr. v to gr. xx. The best form, particularly in asthma, is the *tincture* (four troyounces to diluted alcohol Oij), which may be given in the quantity of f℥j, to be repeated as occasion may require.

Acetum Lobeliæ (*Vinegar of Lobelia*), is a good preparation, in which the alkaloid is fixed by the acetic acid; it is of the same strength, and may be given in the same doses as the tincture.

CONIUM—HEMLOCK.

Conium maculatum, or Hemlock (*Nat. Ord.* Apiaceæ), is a biennial European plant, naturalized in many parts of the United States. Its stem is erect, from three to five feet high,

Fig. 7.

round, smooth, and often spotted with purple. The leaves are large, bright-green, and repeatedly compound; the flowers are small, white, and arranged in umbels, appearing in June and July. The whole plant is narcotic and virulent, and has a fetid, heavy odor. The leaves are the only portion used in medicine. They should be gathered when the plant has done flowering, and kept in vessels from which the air and light

are excluded. Plants grown in sunny situations and warm climates are most active. When well preserved, the dried leaves have a fine green color, and the characteristic smell and bitterish taste of the fresh herb, though less powerfully.

The active principle of hemlock is a peculiar alkaloid, termed *conia* ($C_{16}H_{15}N$), which exists in larger proportion in the seeds than the leaves. It is a colorless, oily fluid, sparingly soluble in water, and freely so in alcohol and ether; and is a highly energetic poison even in very small doses.

Physiological Effects.—The action of hemlock in small medicinal doses is considered to be alterative and even tonic. Resolvent properties, in cases of glandular enlargement, have been attributed to it, and atrophy of the mammæ and testicles is said to have resulted from its continued employment. It is usually classed with the sedative narcotics, paralyzing the nerves of motion rather than those of sensation. In large doses, it causes nausea, vertigo, dimness of vision, relaxation of the muscles; and in poisonous quantities, dilatation of the pupils, difficulty of speech, delirium or coma, paralysis, and finally convulsions and death. It has no direct hypnotic effect. In cases of poisoning, alcoholic stimuli are to be given.

Medicinal Uses.—It is employed chiefly as a general and topical anodyne, to relieve the pain of malignant tumors; and, even if destitute of the deobstruent powers which have been ascribed to it, it certainly exerts a remarkable palliative influence upon painful chronic indurations. It has been also recommended as an antispasmodic in whooping-cough, asthma, and especially tetanus; as an anodyne in neuralgia; as an adjuvant to other remedies in mania, especially melancholia; to relieve irritability of the sexual organs; and it is used externally as a cataplasm to cancers and other irritable ulcers. Conium is the *cicuta* of Hippocrates, Galen, and Pliny, and is supposed to have been the poison administered to Socrates and Phocion.

Administration.—The officinal preparations of this medicine are the powder, tincture, and extract. The dose of the *powdered leaves* is gr. iij to gr. iv, twice a day, to be rapidly in-

creased, till vertigo or nausea ensue. The *extract* (inspissated juice) may be given in the same doses; it is an uncertain preparation, and should be rejected unless it have a strong and penetrating odor. A *tincture* (four troyounces to diluted alcohol Oij, dose f℥ss, f℥j), an *alcoholic extract*, and a *fluid extract* are also used; of the *fluid extract* (a fluidounce of which contains a troyounce of the leaves,) the dose is four or five minims. All the preparations made from the *dried* leaves are, however, comparatively feeble, and the best form in which to prescribe conium is the *Succus Conii*, (which is prepared by adding one volume of alcohol to three volumes of the recently expressed juice of the fresh plant,) dose f℥i–iv.

ACONITUM—ACONITE.

Aconiti Folium, Aconite Leaf; Aconiti Radix, Aconite Root.

Aconitum Napellus, Aconite, Wolfsbane, or Monkshood (*Nat. Ord.* Ranunculaceæ,) is a native of the mountainous parts of Europe. It is a perennial, herbaceous plant, with a fusiform root, a simple erect stem, growing usually to the height of from two to four feet, palmate, deeply cleft leaves, and large, dark, violet-blue flowers. The LEAVES and ROOT are both used, but the root is the more powerful. They have little or no smell; but their taste is bitterish and acrid, and when chewed they occasion a peculiar feeling of tingling and numbness, in the tongue and interior of the mouth. These properties are impaired by long keeping, and the plant loses its medicinal efficacy. Other species of aconite possess similar poisonous qualities to those of the A. Napellus. The active principle of aconite is an alkaloid named *aconitia*, which is officinal.

Physiological Effects.—Taken in small doses, aconite produces a sensation of numbness in the head, face, and extremities, with a sedative action on the circulation, and more or less nausea and muscular debility. In larger doses, its effects are those of an acro-narcotic poison; gastric irritation, purging, contraction or expansion of the pupils, numbness or paralysis

of the limbs, syncope, convulsions, and death. In case of poisoning, the stomach is to be thoroughly evacuated, and stimulants, externally and internally, are to be freely administered.

Medicinal Uses.—Aconite is a powerful and valuable remedy, in the treatment of neuralgia, chronic rheumatism, gout, and other painful diseases, as might be inferred from its *benumbing* effects on the system. From its influence on the circulation, it is employed to reduce inflammatory action, and as a remedy in hypertrophy and other cases of irregular or excessive action of the heart. In controlling abnormal cardiac action, aconite is perhaps the most available article we possess. As a *topical* anodyne, in neuralgia, it has no superior.

Administration.—The dose of the *powdered leaves* is gr. j to gr. ij; of the *alcoholic extract* of the dried leaves, gr. $\frac{1}{2}$ to gr. j; of the *tincture* of the leaves (four troyounces to diluted alcohol Oij), 20 to 30 drops; of the *tincture* of the root, which is by far the best preparation (twelve troyounces to alcohol Oij), 5 to 10 drops. These doses are to be repeated twice or thrice daily, and cautiously increased, till the effects of the medicine are apparent. The tincture and alcoholic extract may be used externally.

ACONITIA ($C_{60}H_{47}NO_{14}$) is prepared from an aqueous solution of an alcoholic extract of aconite root, by the addition of sulphuric acid (which converts the natural salt of aconitia into a sulphate); it is then freed from its oily and resinous portions by means of ether; the alkaloid is subsequently precipitated with ammonia, then redissolved by ether, and again separated from this menstruum by evaporation. It is a white amorphous powder, with a tinge of yellow, without smell, of a bitter taste, and produces in the mouth a sense of numbness. It is partially soluble in water, and is readily dissolved by alcohol, ether, and chloroform. It colors concentrated hot phosphoric acid purple, and its watery solution gives a voluminous amorphous precipitate with the iodo-hydrargyrate of potassium.

Aconitia is an exceedingly virulent poison, more powerful when pure than hydrocyanic acid. It is scarcely adapted to internal use, as even one-fiftieth of a grain has produced

alarming results. As a topical agent in neuralgia and rheumatism, it has been employed with great success, in alcoholic solution (gr. i–ij to f℥j), or as an ointment (gr. ij to lard ℥j, rubbed up with alcohol gtt. vj).

EXTRACTUM CANNABIS—EXTRACT OF HEMP.

"An ALCOHOLIC EXTRACT of the dried tops of Cannabis sativa —variety Indica," was introduced into the Materia Medica in the edition of the U. S. Pharmacopœia preceding the last. Cannavis sativa, or Hemp (*Nat. Ord.* Cannabinaceæ) is a native of Persia and the northern parts of India, and is cultivated in Europe, and in the United States. Narcotic virtues were formerly thought to exist only in the Cannabis Indica or Indian variety of the plant, but recent investigation seems to show that the hemp plants, raised in the Southern States, as Kentucky, are active, and might replace the East Indian drug.

The medicinal properties of the plant reside in a resinous substance, which exudes from glands upon the surface of the stalks and leaves, and the *extract* is made by evaporating a tincture of the dried tops. Under the name of *purified extract of hemp*, (*extractum cannabis purificatum*), the U. S. Pharmacopœia directs a preparation made by evaporating a tincture of the crude extract, thus securing greater uniformity of strength. *Extract of hemp* is of a dark, olive-green color, a fragrant narcotic odor, and a bitter, acrid taste. It is soluble in alcohol and ether, but not in water. The resin, which is probably the active principle, has received the name of *cannabin.*

Effects and Uses.—The medicinal properties of Cannabis Indica are narcotic and antispasmodic, and in India both the herb and resin are extensively used as intoxicating exhilarants, under the name of *haschisch.* In large doses it is sedative, producing relaxation of the muscles, heavy sleep, and abatement of pain, without much affecting the secretions; but opinions are by no means settled in the United States and Great Britain as to its effects. It has been chiefly extolled as an antispasmodic in traumatic tetanus, and has been employed with suc-

cess in other spasmodic diseases, chorea, hysteria, &c., and as an anodyne in rheumatism, gout, neuralgia, &c. It has also been given with advantage as an hypnotic both in mania and in mania-a-potu; and its powers of exciting uterine contractions, and of checking uterine hemorrhagic discharges, are highly spoken of. Dose, from half a grain to two or more grains. The *tincture* is made by dissolving *three hundred and sixty grains* of the *purified extract* in a pint of alcohol; forty drops of this are about equal to a grain of the extract.

HUMULUS—HOPS.

Hops are the STROBILES of Humulus lupulus, or Hop-vine (*Nat. Ord.* Urticaceæ), a climbing vine, indigenous in Europe, and probably also in North America, with serrated, rough leaves, and greenish-yellow flowers. The medicinal portion is the fruit, or STROBILES, which are also largely employed in the preparation of malt liquors, and are known as *hops*. They consist of thin, somewhat translucent, veined, leaflike bracts or scales, of a greenish-yellow color, a strong, fragrant, narcotic odor, and a bitter, aromatic, slightly astringent taste. Near their base are two small, round, dark seeds, covered with aromatic glands or grains, which are the active portion of the hops, and are termed *lupulin*. They are separated by threshing, rubbing, and sifting the scales, and constitute about a sixth part of the weight of hops.

LUPULIN (*lupulina*) is officinal, and consists of rounded or reniform, rather transparent grains, of a cellular texture, and a golden-yellow color. It is slightly soluble in water, and completely so in alcohol, and is composed of a volatile oil, a bitter principle termed *lupulite*, resin, tannic acid, and other matters. The scaly bracts contain a small portion of lupulinic matter.

Effects and Uses.—Hops are narcotic and tonic. The narcotic properties probably reside in the volatile oil, and the tonic properties in the bitter principle. They are said, also, to possess antaphrodisiac properties, and sometimes prove diuretic. The odorous emanation is employed as an hypnotic

by means of the hop-pillow. Internally, they are given to relieve restlessness, induce sleep, and allay pain, and are also much employed for their stomachic and tonic effect. The combination of tonic and narcotic virtues renders hops an excellent remedy in mild forms of mania-a-potu. Topically, they are employed in the form of fomentation or poultice, as a resolvent or discutient, in painful swellings and tumors.

Administration.—Hops are given in the form of *infusion* (half a troyounce to boiling water Oj), and *tincture* (five troyounces to diluted alcohol Oij), dose f℥j to f℥iij.

The best preparation for internal use is LUPULIN, in the dose of gr. v to gr. xij, in powder or pills. The *tincture of lupulin* (four troyounces to alcohol Oij) may be given in the dose of f℥j to f℥ij. The *fluid extract* is a concentrated tincture, containing the virtues of an ounce of lupulin in a fluidounce. The oleoresin also is officinal—dose, gr. ij to v.

DULCAMARA—BITTERSWEET.

The STALKS of Solanum Dulcamara, the Woody Nightshade, or Bittersweet (*Nat. Ord.* Solanaceæ), a European vine, naturalized in the United States, possess combined narcotic and diaphoretic properties. They are of a greenish-gray color, about the thickness of a quill, and have, when fresh, an unpleasant odor, which they lose by drying. Their taste is at first bitter, afterwards slightly acrid and sweet. The active principle is a poisonous alkaloid termed *solania*, which has been found also in Solanum tuberosum, or common potato, and S. nigrum, or black nightshade.

Effects and Uses.—In small doses, the most obvious effects of Bittersweet are an increase in the secretions from the skin and mucous surfaces, with some diminution of sensibility. In excessive doses it is an acro-narcotic poison. It is principally used in the form of decoction (a troyounce boiled in a pint of water for fifteen minutes, and water enough afterwards added

to make the decoction measure a pint),* in painful cutaneous affections, and also in chronic catarrh, rheumatism, and gout. An *extract* (dose, ten to twenty grains,) and *fluid extract* (of which a fluidounce represents a troyounce of the stalks), are both officinal.

ACIDUM HYDROCYANICUM DILUTUM—DILUTED HYDROCYANIC ACID.

Hydrocyanic acid, known also as cyanhydric acid, and *prussic* acid, is found in a variety of vegetable substances, as the bitter almond, peach kernels and leaves, wild cherry, cherry laurel, &c. It is employed in medicine only in a state of extreme dilution; and the diluted acid is obtained by the action of sulphuric acid and water on the ferrocyanide of potassium, or, when wanted for immediate use, by the action of muriatic acid and water on cyanide of silver.

Diluted hydrocyanic acid is a colorless, volatile liquid, with a peculiar odor, and a cooling, somewhat irritating taste. It undergoes decomposition if exposed to the light, and should be kept in bottles covered with black paint or paper. It contains two per cent. of the anhydrous or concentrated acid.

The anhydrous acid (HCy, or HNC_2) is a colorless, transparent, very volatile and decomposable liquid, with a powerful, peculiar odor, and a cooling, afterwards burning taste. Both water and alcohol dissolve it readily. It consists of one eq. of cyanogen and one of hydrogen. Its presence in a suspected mixture may be detected by the addition of a solution of nitrate of silver, which throws down a white, curdy precipitate of cyanide of silver, distinguishable by its exhaling the peculiar odor of prussic acid on the addition of muriatic acid; or (the best test) the hydrocyanic acid may be converted into hydrosulphocyanate of ammonia by the addition of bihydrosulphate

* This is the usual formula for the decoctions, and is the mode of preparation of all those which are stated to be of the strength of an ounce to a pint of water.

of ammonia, and the salt thus formed yields a deep blood-red color upon the addition of a sesquioxide salt of iron.

Physiological Effects.—When taken in medicinal doses, gradually increased, hydrocyanic acid occasions a bitter taste, increased flow of saliva, irritation in the throat, nausea, headache, giddiness, faintness, disorder of the vision, and tendency to sleep. The pulse is sometimes accelerated, but more commonly depressed. In a poisonous dose, hydrocyanic acid arrests life with fearful rapidity, and is one of the most energetic poisons known, one or two drops of the pure acid being sufficient to destroy a dog in a few seconds. When not immediately fatal, it produces great and sudden prostration, trismus, difficult and spasmodic respiration, dilatation and immobility and sometimes contraction of the pupils, convulsions, &c. The best *antidotes* are chlorine, and a mixture of sulphate of iron (gr. x to water f℥j), tincture of chloride of iron (f℥j), and carbonate of potassa (℈j), in water (f℥j or ij); inhalations of ammonia or its carbonate, and (if the patient can swallow), alcoholic stimuli are to be employed, and at the same time cold affusions and artificial respiration are to be also resorted to. The subcutaneous injection of the sulphate of atropia has been also found available, acting as a physiological antidote.

Medicinal Uses.—Hydrocyanic acid is a valuable agent in allaying spasm, pain, and nervous irritability, in a variety of disorders, and is much used to relieve cough, particularly in phthisis pulmonalis, and for its antispasmodic virtues in asthma and whooping-cough. It is, moreover, a most efficacious remedy in gastrodynia, and in neuralgic affections of the bowels, and also in chronic vomiting. Topically, it is employed as an anodyne in neuralgia, and in various forms of cutaneous diseases (f℥j to water Oj–Ojss).

Dose of the officinal acid, one or two drops, to be repeated and gradually increased by a drop, till some effect is perceptible. When it is taken for a length of time, care should be observed to have the medicine, as renewed, of uniform strength; and it is best, in using a fresh sample, to return to the minimum dose.

Potassii Cyanidum (*Cyanide of Potassium*), (KCy) is used as a substitute for hydrocyanic acid, and has the advantage of being a more uniform chemical product, and less liable to undergo decomposition. It occurs in white, opaque, amorphous masses, having a sharp, somewhat alkaline and bitter-almond taste, and its solution yields the odor of hydrocyanic acid, when exposed to the air. It is very soluble in water, and sparingly so in alcohol. Its medicinal and poisonous effects are the same as those of hydrocyanic acid. Dose, gr. $\frac{1}{8}$ in half an ounce of distilled water, to be repeated and increased. The addition of a few drops of some vegetable acid frees the hydrocyanic acid, and the same effect is produced by the acids of the stomach.

Oleum Amygdalæ Amaræ (*Oil of Bitter Almond*), contains hydrocyanic acid, and may be used for the same purposes. It is obtained by distillation from the fruit of Amygdalus communis, variety *Amara* (*Nat. Ord.* Amygdaleæ,) and is of a yellowish color, with a bitter, acrid, burning taste, and the peculiar odor of the bitter almond, which is different from that of hydrocyanic acid. It is heavier than water, slightly soluble in it, and soluble in alcohol and ether. Its effects upon the system are closely analogous to those of hydrocyanic acid, and its strength is about four times that of the diluted officinal acid. Dose, for internal use, a quarter to half a drop in emulsion; as an external application, one drop to a fluidounce of menstruum. *Bitter Almond Water* is used as a vehicle for narcotic medicines. Dose, half a fluidounce.

Syrupus Amygdalæ (*Syrup of Almond*), made from both the sweet and bitter almonds, is slightly impregnated with the virtues of hydrocyanic acid, and is a pleasant vehicle for cough mixtures. The following is the formula for preparing it: Rub twelve troyounces of blanched sweet almonds and four troyounces of bitter almonds to a fine paste, adding, during the trituration, three fluidounces of water and twelve troyounces of sugar. Mix the paste with two pints and thirteen fluid-

ounces of water, strain, and dissolve in this solution, at a gentle heat, sixty troyounces of powdered sugar.

CAMPHORA—CAMPHOR.

Camphor is a peculiar CONCRETE SUBSTANCE, derived from Camphora officinarum, or the Camphor Laurel (*Nat. Ord.* Lauraceæ), a large evergreen tree of China, Japan, and Cochin-China. All parts of the tree are strongly impregnated with camphor, which is obtained from the roots and branches by sublimation. In this state it is known in commerce as *crude camphor*, and consists of dirty grayish grains, adhering in crumbling masses. *Japan* camphor (called also *Dutch* camphor) has a pinkish color, and is purer than the *China* camphor, but it is not brought to the United States. The crude camphor, as imported from Canton, is not found in the shops, until it is refined by resublimation with lime, when it is termed *refined camphor*.

This occurs in large hemispherical or convex-concave cakes, perforated in the middle. It is solid at ordinary temperatures, soft and somewhat tough, but may be readily powdered by the addition of a few drops of alcohol. It is translucent, has a strong, fragrant odor, and an aromatic, bitter, afterwards cooling, taste. It is volatile, highly inflammable, lighter than water, and very slightly soluble in it, but soluble in alcohol, ether, chloroform, oils, and acids. Water, added to the spirit of camphor, precipitates the camphor.

A valuable camphor is known in the East, which is found in a concrete state in the cavities and fissures of the trunk of Dryobalanops Camphora, a tree of Borneo and Sumatra. The Borneo camphor occurs in small fragments of crystals, which are transparent, brittle, and harder than the laurel camphor. An oil, or liquid camphor, is also obtained from the Dryobalanops, which is more highly esteemed in Oriental countries than the camphor itself.

Camphor is composed of carbon, hydrogen, and oxygen ($C_{20}H_{16}O_2$). It has been considered to be an oxide of a hy-

pothetical base called *camphogen* or *camphene*, which is isomeric with the oil of turpentine. When heated, it yields an oil, called *oil of camphor*. By passing hydrochloric acid into oil of turpentine, a substance is obtained called *artificial camphor*.

Physiological Effects.—The topical action of camphor is irritant. After its absorption, its effects, in small doses, are moderately stimulant, exhilarant, and anodyne, with a determination to the skin In large doses, it causes considerable disorder of the cerebro-spinal system, and generally depression of the circulation; and in excessive quantity, it acts as a powerful acro-narcotic poison, occasioning burning heat in the stomach, violent convulsions, and maniacal delirium. It is also an anaphrodisiac. In cases of poisoning, after evacuating the stomach, opium, wine, &c., are to be administered.

Medicinal Uses.—From its combined narcotic and diaphoretic powers, camphor is a valuable remedy in the treatment of dysentery, and is much employed in this disease, either in combination with opium, or as a substitute for the latter. In the early stages of cholera, and in flatulent diarrhœa, it is also greatly prescribed. As a diaphoretic stimulant and antispasmodic, it is useful in the low stages of typhoid and typhus fevers, and in typhoid conditions of the system generally. In many forms of mental disorder, it calms irritability, relieves despondency, and induces sleep. And it has no superior among the anodynes, in allaying irritation or pain of the genito-urinary organs, as in dysmenorrhœa, uterine after-pains, strangury, nymphomania, chordee, &c. From its anodyne and sudorific properties, it is also applicable to the treatment of chronic rheumatism and gout. *Externally*, camphor is employed as an anodyne in rheumatism, and as a discutient in chronic inflammatory affections. Powdered camphor, sniffed into the nostrils, is a good remedy in coryza and influenza.

Administration.—The medium dose, in substance, is gr. v to gr. x; but it may vary from gr. j to ℈j. It is best given in emulsion, made by rubbing up the camphor with loaf sugar, gum arabic, myrrh, and water. The form of pill is objection-

able, from the difficulty with which it is dissolved in the gastric liquors.

Aqua Camphoræ (*Camphor Water*), is made by rubbing up camphor (120 grains) with 40 minims of alcohol, and subsequently with carbonate of magnesia (half a troyounce) and distilled water (two pints). The carbonate is used to promote the solution of the camphor, and is afterwards separated by filtration. Dose, f℥j (containing about gr. iij) to f℥ij or iij. The *spirit* (four troyounces to alcohol Oij), is chiefly used as an embrocation, but it may be given internally, where the action of the alcohol is not objectionable, in the dose of gtt. v to f℥j.

Linimentum Camphoræ (*Camphor Liniment*), consists of camphor (1 part), dissolved in olive oil (4 parts): a mild embrocation.

Linimentum Saponis, (*Soap Liniment*), is made by digesting soap (four troyounces) and camphor (two troyounces) with oil of rosemary (half a fluidounce), in alcohol (two pints) and water (four fluidounces). It is a yellow oleaginous liquid, and is used as an anodyne and gently rubefacient application, in gouty and rheumatic pains, sprains, bruises, &c.

Oleum Camphoræ (*Oil of Camphor*), the volatile oil obtained from Camphora officinarum, is a light reddish-brown fluid, with the odor and taste of camphor. It has medicinal properties similar to those of camphor, but is more stimulant, and therefore especially adapted to affections of the stomach and bowels. Dose, 2 or 3 drops. It is used also externally.

PHYSOSTIGMA—CALABAR BEAN.

This article, although not officinal, has been recently employed in spasmodic diseases with much effect. It is derived from a perennial creeping plant of the western coast of Africa, which has received the name of Physostigma venenosum (*Nat. Ord.* Fabaceæ). The seed is about the size of a large horse-bean, irregularly kidney-form, in shape, with a firm, hard, brittle, reddish or greyish-brown integument. The inner kernel is by far the more active portion; it is hard, white, pulverizable,

of an edible taste, without bitterness or acridity. Alcohol, but not water, extracts its medicinal virtues. It is said to have yielded an active principle, termed *physostigmin.*

The calabar bean has long been used among the negroes of Western Africa, as an ordeal to determine the guilt or innocence of accused individuals, whence its name, the *ordeal bean of Calabar.* It has been found, in full medicinal doses, to produce giddiness, torpor, paleness and coolness of the surface, weak and irregular pulse, relaxation of the muscular system, and drowsiness, but not stupor. An interesting effect of its action is a remarkable power of contracting the pupil, whether taken internally or applied externally; and it also contracts the ciliary muscle, which regulates the accommodating power of the eye. As a neurotic, its influence is more decided upon the spinal marrow than the brain.

Calabar bean has been found highly efficacious in traumatic tetanus. It has been used also with success in chorea, and in poisoning from strychnia, and spasmodic cholera. In ophthalmic surgery, its employment is obvious, either to produce contraction of the pupil, or to increase the power of accommodating the eye to distances.

The dose of the kernel is laid down as two or three grains, to begin with, gradually increased. By exhausting the kernel with alcohol, an *alcoholic extract* is obtained, of which the dose is one-eighth of a grain. The best form of administration is a *tincture*, which may be made from the alcoholic extract, in the proportion of twelve grains to an ounce of alcohol—dose 10 drops; or a solution in glycerin may be used. Paper, impregnated with a concentrated tincture of the bean, and afterwards dried, has been applied locally to the eye.

COCCULUS—COCCULUS INDICUS.

This is the DRIED SEED of Anamirta Cocculus, (*Nat. Ord.* Menispermaceæ), a climbing shrub of India. The fruit is a one-celled berry, of a dark, purplish color, with a soft pulp, and a single *seed.* This, when dried, is about the size of a pea,

of a dark grayish color, and consists of a thin, dry, blackish, wrinkled integument, containing a whitish, oily, inodorous, very bitter kernel. The active properties reside in a peculiar white, crystallizable, bitter principle, termed *picrotoxin*, which is partially soluble in water, and very soluble in alcohol and ether. In the shell, an alkaloid termed *menispermia* has been found, and a neutral principle of the same composition as the alkaloid, termed *paramenispermin*.

Effects and Uses.—Cocculus Indicus is an acrid cerebro-spinant narcotic, capable, in large doses, of producing death. It has not been much used internally; but in the form of decoction or ointment, is employed to destroy lice and other parasites, and for the cure of tinea and porrigo of the scalp. It is said to prevent the secondary fermentation of malt liquors, into which it is sometimes introduced as an adulteration. Cocculus Indicus is not officinal.

WOORARA.

This substance, termed also *woorari*, *woorali*, and *curare*, has long been known as a powerful poison, prepared by the Indians in S. America, and, of late years, has been employed as a medicine. Its source is unsettled, but it is generally considered to be an extract from the bark of an unknown plant. It is brought from the shores of the Amazon, and occurs in the form of dark-brown or grayish lumps or powder, of an intensely bitter taste, and, when triturated, of a powerful odor. A principle termed *curarine* is said to have been extracted from woorara.

Effects and Uses.—Woorara is ranked with the sedative narcotics, and is considered to destroy life by more or less rapid paralysis of the respiratory muscles. A peculiarity of its action is that it is comparatively innoxious when taken by the stomach, being either not absorbed at all in this viscus, or so slowly, as to allow of its elimination by the kidneys, before dangerous accumulation in the blood. Hence, for therapeutic purposes, it must be employed either endermically to a blis-

tered surface, or by hypodermic injection. The diseases in which it has been chiefly used, are tetanus and epilepsy. The amount administered *endermically* is from a half to three quarters of a grain daily.

ORDER II.—ETHEREAL ANÆSTHETICS.

The term, Anæsthetics, (from *a non*, and *αἴσθησις sensation*,) properly speaking, includes all agents which diminish sensibility and relieve pain. It has however, been used to denominate a class of ethereal remedies, which are applied by inhalation, and produce such a condition of temporary insensibility, as to prevent pain during surgical operations and parturition.

The vapors usually employed to produce anæsthesia are those of ETHER and CHLOROFORM. Many other substances have, however, lately been introduced as anæsthetics.

ÆTHER—ETHER.

Ether is prepared by the distillation of alcohol and sulphuric acid, and is afterwards rectified by redistillation with solution of potassa. For inhalation, however, it is further purified by being shaken with water, by which it is freed from alcohol, and this, as well as acid contaminations, are afterwards removed by the agency of chloride of calcium and freshly calcined lime. Thus purified, it is designated as ÆTHER FORTIOR —STRONGER ETHER.

Although commonly termed sulphuric ether, in allusion to the sulphuric acid used in its preparation, yet ether contains no sulphuric acid. By the action of the acid upon alcohol, this substance, which is chemically a hydrated oxide of ethyl, is deprived of the elements of water, and is converted into the oxide of ethyl or ether, for which the formula is C_4H_5O.

Ether is a transparent, colorless liquid, with a strong, fragrant odor, and a hot, pungent taste. It wholly evaporates in the air, so rapidly as to cause a considerable degree of cold, is very inflammable, combines with alcohol and chloroform in

every proportion, and dissolves in ten times its volume of water. The sp. gr. of pure ether is 0.713, of *stronger ether*, 0.728, of ordinary *officinal ether*, 0.750. The boiling point of *stronger ether* is about 98° F.

Effects and Uses when Swallowed.—When taken into the stomach, ether produces a primary stimulant and secondary narcotic effect, the stage of excitement being, however, very transient. It has long been employed as an antispasmodic and anodyne remedy in asthma, angina pectoris, hysteria, cramp of the stomach and bowels, spasm of the gall ducts, &c.; and from its combined stimulant and antispasmodic virtues, it has been found useful in the latter stages of typhus, attended by subsultus tendinum, &c. As a *topical* anodyne, ether is a very good application in nervous headache and earache; it has been also applied with advantage in aphthæ, stomatitis, diphtheria, and other affections of the mouth and throat; and from its refrigerant effects, it has been used in the reduction of strangulated herniæ, and as a cooling lotion in cerebral affections. If evaporation be repressed, when it is applied locally, it acts as a rubefacient, and may be employed for counter-irritation.

Dose, f℥ss to f℥j, to be increased when habitually used. It may be incorporated with water, by rubbing it up with spermaceti, in the proportion of two grains to a fluidrachm of ether, or it may be given in capsules of sugared gum.

Effects and Uses when Inhaled.—When the vapor of ether is absorbed into the system through the pulmonary surface, the nervous functions are successively and progressively affected. The mental faculties and volition become first impaired; insensibility and unconsciousness rapidly supervene, *during which susceptibility to pain is lost;* and the patient lies in a trance-like sleep, resembling death. This condition is often preceded by one of excitement, during which patients sometimes moan, sing, rave, or present pugnacious manifestations. In the beginning of etherization, the circulation is accelerated, but it is afterwards depressed. The period of intoxication lasts from five to ten minutes, and the patient ordinarily recovers without serious inconvenience; although headache, nausea, drowsiness,

and languor sometimes ensue for a few hours. Occasionally, congestion of the brain or lungs, cataleptic rigidity with prolonged insensibility, and, in females, hysterical phenomena ensue after etherization; but these effects are uncommon, and it is believed that death has never followed the use of ether, when care has been taken to admit atmospheric air into the lungs along with the ether. During the stage of insensibility, convulsive twitches or muscular rigidity are occasionally noticed; the breathing is sometimes stertorous; the iris becomes fixed; the pupils are dilated; the eyeballs are upturned; and the orbicularis palpebrarum does not contract when touched. Insensibility to pain in some cases takes place before unconsciousness; and when patients are recovering from the latter state, the mental faculties are often completely restored, while insensibility to pain continues.

Since the year 1846, the inhalation of ether, first resorted to in our own country, has been practised very generally in all parts of the world, with the greatest success, for the prevention of pain in surgical operations; and its use has been also extended with the happiest results to the relief of pain in labor.

It should not be exhibited where disease of the heart or brain, or serious obstruction of the lungs exists, or when from any cause there is unusual tendency to syncope, and precaution should be taken to guard against asphyxia; but, when administered with proper care and discrimination, it is attended with little or no danger or unpleasant results of any kind.

The quantity of ether necessary to effect etherization is about two ounces; and it may be conveniently applied by means of a soft sponge or handkerchief. The sponge is usually adjusted in shape to the projection of the nose, and, after being soaked in warm water, and squeezed dry, is saturated with pure ether. It is then applied to the nostrils, the mouth being left free to receive atmospheric air; and, if irritability of the air-passages occur, this is to be gradually overcome. From three to five minutes are required to produce anæsthezation, and its occurrence is known by closure of the eyelids (if they have been

previously open), failure to respond to questions, and muscular relaxation. The sponge is then to be removed, and may be re-applied from time to time if necessary.

Etherization has been also resorted to in a variety of morbid conditions, in which the administration of narcotics and anti-spasmodics has been found useful. It exerts a powerful control over the violent types of spasmodic disease, and has been prescribed with the greatest advantage in hysteria, tetanus, poisoning from strychnia, asthma, chorea, convulsions, puerperal eclampsia, whooping-cough, dysmenorrhœa, and almost every description of spasm; and as a relaxant in the reduction of dislocations.

Local anæsthesia and congelation may be produced through the agency of the ether spray applied to a part by the atomizer, (see p. 38).

CHLOROFORMUM—CHLOROFORM.

Chloroform is usually obtained from the distillation of alcohol with chlorinated lime, and for medicinal use, the chloroform of commerce requires purification, which is accomplished by shaking it with sulphuric acid. This destroys the chlorinated pyrogenous oil, which contaminates the chloroform, and the sulphurous acid formed and the water present are afterwards removed by means of alcohol and carbonate of potassa. The purest chloroform, for internal use, is now made from the hydrate of chloral.

Purified Chloroform (*Chloroformum Purificatum*) is a colorless, volatile liquid, of a bland, ethereal odor, and a hot, aromatic, saccharine taste. It is not inflammable, is slightly soluble in water, and freely soluble in alcohol and ether. It has extensive solvent powers, dissolving camphor, the fixed and volatile oils, most resins and fats, iodine, bromine, the organic alkalies, &c. The purest chloroform has a sp. gr. of 1.5022. Officinal chloroform has a sp. gr. of 1.49 to 1.494, when it contains a little alcohol; and, as usually found, its sp. gr. is about 1.475, when it contains more alcohol, and is less apt to

become acid. The boiling point of pure chloroform is between 144.14° and 144.45° F. It is, chemically, a terchloride of formyl, C_2HCl_3. Chloroform is sometimes contaminated with chlorinated pyrogenous oils (a very injurious impurity); these may be detected and removed by strong sulphuric acid, which gives the chloroform a color varying from yellowish to reddish-brown, according to the amount of impurity. The most delicate test for the presence of alcohol is the binitrosulphuret of iron, which, when agitated with chloroform, will produce a brown tint if alcohol be present.

Physiological Effects.—The effects of chloroform on the system are analogous to those of ether, but much more rapid and powerful. When inhaled, in the dose of a fluidrachm or more, it rapidly induces anæsthetic sleep, with great relaxation of the muscles, and the most complete insensibility to painful agents. The period at which insensibility occurs varies from fifteen seconds to two minutes; and it continues usually between five and ten minutes, and may be prolonged considerably, by renewals of the inhalation. The patient usually recovers without recollection of what has occurred during the state of insensibility, and with few or no uncomfortable sequelæ.

The administration of chloroform has, in some cases, been attended with fatal syncope. This has ordinarily occurred with such rapidity as to render remedial interference unavailing; but, at the slightest approach of symptoms of the kind, the patient should be placed in a recumbent position, cold affusions should be applied, and, above all, electro-magnetism should be resorted to. It would be proper always to have an electro-magnetic machine ready for use, when chloroform is inhaled.

Topically applied, and when its evaporation is prevented, chloroform acts as an irritant, and soon vesicates the skin—powerfully diminishing painful impressions during its application.

Medicinal Uses.—Chloroform is prescribed by the stomach as an anodyne and antispasmodic, in all the cases to which ether is applicable, and has the advantage of a more agreeable

taste. It has been found particularly useful to relieve the pain and vomiting of cancer of the stomach. It has been also extolled as an antiperiodic in the treatment of intermittent fevers. Externally, it is used as a topical anodyne, and also as a stimulating application to foul and indolent ulcers, and occasionally for its constitutional effects.

Dose, from f℥ss to f℥j, in sweetened water or mucilage; to be repeated. As an anti-neuralgic liniment, f℥j to f℥ij of camphor liniment; or as a rubefacient and anodyne, undiluted, on linen, covered with oiled silk, to prevent evaporation. As a wash or gargle, f℥j or ij to water Oj.

The introduction of chloroform, as an anæsthetic, took place shortly after that of ether; and, from its greater intensity of action, its freedom from irritating effects on the bronchial mucous membrane, its more agreeable odor, and its non-inflammability, it has been extensively used, particularly in Great Britain, to the exclusion of ether. A number of fatal cases have, however, occurred from the inhalation of this agent, where its administration did not appear in any way counter-indicated; and it can scarcely be considered a perfectly safe remedy. It is employed as an anæsthetic, anodyne, and antispasmodic, to fulfil the indications to which ether is applicable.

The *dose* for inhalation is a fluidrachm, to be repeated in two minutes, if anæsthesia be not produced; and its effects may be renewed from time to time, without injury. It may be applied on a handkerchief, held near the nose or mouth, care being taken to allow a proper admixture of atmospheric air.

A solution of chloroform in ether has been used in the United States, but from the unequal volatilization of the two liquids, it must be difficult to modify their effects by combination.

Spiritus Chloroformi (*Spirit of Chloroform*), is a solution of one part of chloroform in six parts of alcohol; a convenient form for internal exhibition. *Dose*, f℥ss–f℥j.

Liniment of Chloroform is made by mixing three parts of chloroform with four parts of olive oil.

Mixture of Chloroform is made by mixing chloroform, in which camphor is dissolved (*sixty grains* in *half a troyounce* of chloroform), with six fluidounces of water, by the intervention of the yolk of an egg. *Dose*, f℥ss–f℥j.

Since the discovery of the anæsthetic properties of ether and chloroform, many other substances have been employed for the purpose of anæsthesia. Of these may be mentioned:

I. Rhigolene, a petroleum naptha, obtained by the distillation of petroleum. It is the lightest of all known liquids, having a sp. gr. 0.625, is highly volatile and inflammable, boils at 70° F., and in its composition is a hydrocarbon, containing no oxygen. It is nearly odorless, and has been employed to produce local anæsthesia through the agency of the atomizer, and is the most convenient, most rapid, and most easily controlled freezing liquid that can be used. Its name is derived from ριγος, *extreme cold.*

II. Bichloride of Methylene.—This liquid is most easily procured by the action of nascent hydrogen (developed from zinc, water, and sulphuric acid), upon chloroform. Its composition is CH_2Cl_2. It is a colorless fluid, having a pleasant ethereal odor like that of chloroform, boils at 88° F., has sp. gr. 1.34, and mixes with ether and chloroform in all proportions. It is said nearly to equal chloroform in efficacy, with less danger to life, while its effects are much more rapid. It may be used in about the same dose as chloroform.

III. Methylic Ether, made by digesting methylic alcohol with strong sulphuric acid, is a gaseous substance, lately employed. Under the name of *methyl-ethylic ether*, it has been used, dissolved in ethylic ether, and is said to produce rapid anæsthesia, without spasm, syncope or asphyxia, during inhalation, or subsequent nausea. One or two drachms may be introduced into a bag inhaler, and the gas is volatilized by means of a hand bellows.

IV. Compounds of Amyl.—Various compounds of amyl ($C_{10}H_{11}$), products derivable from the oxidation of starchy matter, have been proposed as anæsthetics. *Amylic alcohol*, or

fusel oil (the hydrated oxide of amyl, $C_{10}H_{11}O+HO$), is one of the products of the alcoholic fermentation. It is a colorless, oily liquid, of a strong, offensive odor, and an acrid, burning taste. When inhaled by animals, it has been found to produce muscular paralysis and convulsions. *Amylene* ($C_{10}H_{10}$) is prepared by distilling amylic alcohol with a concentrated solution of chloride of zinc. It is a colorless, mobile liquid, having a peculiar disagreeable smell. Of the amyl series, *amylene* alone can be considered as a true anæsthetic, that will produce complete insensibility to pain. An extreme dose is, however, required for this purpose, and its operation is dangerous to life. The *hydruret*, *iodide*, *acetate*, and *nitrite* of amyl have also been employed. Of these compounds, however, the NITRITE alone appears likely to come into use as a therapeutic agent. The NITRITE OF AMYL is prepared by heating one part of strong nitric acid with two parts of rectified fusel oil until the reaction just commences, when the fire is withdrawn. After the violent reaction has subsided, heat is again carefully applied. The distillate obtained below 212° F., is rectified over carbonate of potassa, with the precaution to collect only that portion distilling between 202° and 206° F. It is a nitrite of the oxide of amyl, and is an amber-colored, volatile, inflammable liquid, of sp. gr. 0.913, boiling at 182° F., with an odor and taste like that of ripe pears. Its composition is $C_{10}H_{11}NO_3+HO$. It is not a true anæsthetic, as it does not destroy consciousness, unless a condition approaching to death is produced. It exercises, however, a rapid and powerful influence on the heart and circulation, and as an excitant of vascular action may be considered the most energetic agent as yet physiologically discovered. It has been employed to rouse the system in cases of syncope and prostration, and has been also found efficacious in relieving the pain of angina pectoris, and as a general relaxer of muscular spasm. Experiments upon animals show it to be also a physiological antidote in cases of poisoning from strychnia, and it would probably prove efficacious in tetanus. *Dose*, 5 to 6 drops.

V. TETRACHLORIDE OF CARBON.—This substance, termed

also bichloride of carbon and chlorocarbon, (CCl_4), is made by passing the vapor of bisulphuret of carbon, together with chlorine, through a red-hot porcelain tube; and is purified by agitation with an alcoholic solution of potash, afterwards washing with water, and subsequently redistilling. It is a transparent, colorless fluid, having an ethereal and sweetish odor, not unlike that of chloroform. Its sp. gr. is high, 1.56, and its boiling point, 170° F. It is miscible in all proportions with ether and chloroform. Chlorocarbon has been employed by inhalation, as an antispasmodic, anodyne, and anæsthetic, and has the advantage of a pleasant smell and freedom from nauseating effect. For full and prolonged anæsthesia, however, there are objections to its use in the heaviness of its vapor, its insufficient volatility, and the consequent difficulty of its elimination from the system. It may be inhaled to the extent of f℥i. A mixture of one part of chlorocarbon and six parts of chloroform is recommended as a safe and agreeable anæsthetic. The Tetrabromide of Carbon (CBr_4) has very recently been added to our list of anæsthetics. It may be made by heating bisulphuret of carbon in a sealed tube with bromide of iodine. It is a white substance, crystallizing in plates, of an ethereal odor, somewhat resembling that of tetrachloride of carbon, and sweetish taste. It is insoluble in water, but dissolves in ether, alcohol, bisulphuret of carbon, chloroform, bromoform, benzole, and petroleum.

VI. Nitrous Oxide Gas was the substance by which anæsthesia was in the first instance produced, in the hands of Mr. Horace Wells, a dentist of Hartford, Connecticut. It is made by the decomposition of nitrate of ammonia by heat. Its composition is NO. It is a colorless, respirable gas, absorbable by water, and the solution, like the gas itself, has a faint, agreeable odor and sweet taste. This gas is both a pleasant and efficient anæsthetic, more transitory in its action than either ether or chloroform, and free from disagreeable or serious consequences. It is well adapted to employment in the extraction of teeth, but its effects are too transient for the anæsthesia required in protracted surgical operations. The

amount necessary to produce anæsthesia, (one or two gallons,) as well as the complicated apparatus required for its administration, constitute also an objection to its general use. Water impregnated with about five times its volume of nitrous oxide, has been used internally as a stimulant, in the dose of half a pint to a pint and a half, during the course of the day. In experiments upon dogs, nitrous oxide water injected into the bowels has been found to act as a physiological antidote in cases of poisoning from chloroform, carbonic acid, hydrocyanic acid, and other agents.

ORDER III.—ANTISPASMODICS.

Antispasmodics are medicines that allay irregular nervous action. Their effects upon the economy in a state of health are not very decided, and are limited to a slight stimulation of the circulation, and exhilaration of the mental faculties. Their influence is, however, strikingly shown in certain deranged conditions of the nervous system, particularly in those forms of spasm which depend upon idiopathic or primary nervous disorder. They are also useful in many varieties of mental disturbance, as wakefulness, hypochondriasis, and even insanity, and are often preferable to narcotics in the treatment of these cases, from their comparative freedom of action on the brain.

ASSAFŒTIDA—ASSAFETIDA.

Assafetida is the CONCRETE JUICE of the ROOT of Narthex Assafœtida (*Nat. Ord.* Apiaceæ). This plant is a native of Persia, and has a large, tapering root, the size of a man's leg, with long, lanceolate leaves, springing directly from the root, and an erect stem, from six to nine feet in height, rising from the midst of the leaves. The drug is obtained from incisions made into the root, or by taking successive slices of it. The exuded juice is scraped off, hardened in the sun, and afterwards packed for exportation. It occurs in masses of various sizes,

consistence, and color, but is usually whitish, intermixed with darker spots, and becomes reddish, and finally brown, by exposure to the air. It is sometimes soft and adhesive, at other times hard and brittle, and is not readily powdered, except at a low temperature. It breaks with a waxy lustre, and the best samples appear to be composed of irregularly-shaped tears. Its taste is unpleasant, bitter, and acrid; its odor powerful, alliaceous, and fetid.

Assafetida is a gum-resin, united to a volatile oil. The gum is dissolved by water; and the mucilage thus formed suspends the resin and volatile oil. The resin and volatile oil are soluble in alcohol; but the tincture becomes milky on the addition of water, owing to the separation of the resin.

Physiological Effects.—Assafetida is a moderate excitant and exhilarant, and exerts a marked influence upon morbid conditions of the nervous system. It also stimulates the mucous secretions generally, and increases the peristaltic action of the bowels. Its volatile oil is absorbed, and the odorous principle is recognized in the secretions, especially in the perspiration.

Medicinal Uses.—No medicine is more highly esteemed as a direct antispasmodic than assafetida. It is much resorted to in the various forms of hysteria, and is particularly valuable in relieving the mental depression, which constitutes one of the protean types of this disorder. In other spasmodic diseases, as chorea, asthma, whooping-cough, &c., it is a favorite remedy with many practitioners; and, from its combined expectorant and antispasmodic properties, it is particularly adapted to spasmodic pectoral affections. In certain diseases of the abdominal viscera, as flatulent colic and costiveness, assafetida is often useful as an antispasmodic and laxative enema. It is also prescribed as a stimulating emmenagogue, when the uterine disorder is attended with a disturbance of the nervous functions.

Notwithstanding its disagreeable odor, this drug is largely used as a condiment in Asia; and even in the refined cookery of Europe its flavor is admired. Many persons take it habitu-

ally for its exhilarant effects; and, when used as a medicine, it generally becomes acceptable.

Administration.—Dose, gr. v to ℈j, in pill. It is most frequently given in the form of *mixture* (Mistura Assafœtidæ,—℥ij, rubbed gradually with water Oss),—dose, f℥ss to f℥j, repeated, or as an enema, f℥ij to f℥iv. This mixture, from its whiteness and opacity, is sometimes called *lac assafœtidæ*, or *milk of assafetida*. *Pills of assafetida*, made by beating up three parts of assafetida with one part of soap and a little water, are officinal, each pill containing 3 grains of the gum-resin. The *tincture* (four troyounces to alcohol Oij—dose f℥j), is a good preparation, where the alcohol is not objectionable. A *plaster* is used externally in whooping-cough and catarrh; it is made by dissolving *twelve troyounces* of assafetida and *six troyounces* of galbanum in three pints of alcohol, evaporating to the consistence of honey, and to this adding *twelve troyounces* of lead-plaster and *six troyounces* of yellow wax, previously melted together.

GALBANUM.

Galbanum is the CONCRETE JUICE of an unknown Eastern plant. It is met with in the form of tears, or more commonly in lumps, of a brownish color, and has a peculiar balsamic odor, and a hot, bitter, acrid taste. It is a gum-resin united to a volatile oil. Its effects are similar to those of assafetida, but less active; and it is chiefly employed externally, as a stimulant and resolvent to indolent swellings. The *compound pills of galbanum* are used as antispasmodic and emmenagogue; they are made by beating into a pilular mass *three hundred and sixty grains* of galbanum and myrrh, each, and *one hundred and twenty grains* of assafetida, with a little syrup, the mass to be divided into 240 pills,—dose, 10 to 20 grains. Galbanum forms the basis of the *compound galbanum plaster*, which contains eight parts of galbanum, one part of turpentine, three parts of Burgundy pitch, and thirty-six parts of plaster of lead.

AMMONIACUM—AMMONIAC.

This is the CONCRETE JUICE of Dorema Ammoniacum (*Nat. Ord.* Apiaceæ), a plant of Persia. It comes in tears or lumps, of an irregular shape, yellowish on the outside, whitish within, is moderately hard and brittle, and has an unpleasant, bitter, and rather acrid taste, with a peculiar smell, somewhat like that of galbanum. It is a gum-resin, with a little volatile oil. Its effects are similar to those of assafetida; but it is seldom used, except as an antispasmodic expectorant in chronic catarrh. Dose, gr. x to xxx. A *mixture* and *plaster* are officinal. The *mixture* has the same formula as *mixture of assafetida;* the plaster is made by dissolving *five troyounces* of ammoniac in half a pint of diluted acetic acid, straining, and evaporating to a proper consistence. A *plaster of ammoniac with mercury* is also officinal.

VALERIANA—VALERIAN.

Valeriana officinalis, or Wild Valerian (*Nat. Ord.* Valerianaceæ), is a perennial European plant, growing to the height of three or four feet, with serrated leaves, and small, reddish-white fragrant flowers. The ROOT is the portion used, and consists of numerous long, slender, cylindrical fibres, attached to a rough, tuberculated head. The color of the dried root externally is yellowish or brown, and internally white; when powdered, it is yellowish-gray. It has a peculiar, powerful odor, of which cats are fond, and a bitterish, subacrid, aromatic taste. Water and alcohol extract its virtues, which depend on the presence of a *volatile oil*, from which a peculiar colorless, volatile acid, called *valerianic*, may be separated.

Effects and Uses.—Valerian generally acts as an energetic excitant and antispasmodic, although at times it makes but a feeble impression on the system. It is much used as a nervous excitant and antispasmodic in the various forms of hysteria, and occasionally, also, in epilepsy, chorea, hemicrania, hypochondriasis, delirium tremens, &c.

Dose of the *powder*, from ʒss to ʒjss, three or four times a day; of the *infusion* (half a troyounce to Oj of water), fʒj to ij; of the *tincture* (four troyounces to diluted alcohol Oij), fʒj; of the *ammoniated tincture* (four troyounces to aromatic spirit of ammonia Oij—an excellent preparation), fʒj to ij; of the *fluid extract*, fʒj; of the *alcoholic extract* gr. x to xxx; of the *oil*, 4 or 5 drops.

Ammoniæ Valerianas (*Valerianate of Ammonia*).—This salt, made by combining valerianic acid with ammonia, occurs in snow-white, pearly crystals, of an offensive odor like that of valerianic acid, and a sharp, sweetish taste. It is soluble both in water and alcohol. Much employed in neuralgia, hysteria, chorea, epilepsy, &c. *Dose*, gr. ij–viij, given in coated pills; or an elixir, prepared with aromatics, may be used.

CYPRIPEDIUM.

The root of Cypripedium pubescens, or *yellow lady's-slipper*, (*Nat. Ord.* Orchidaceæ) a common indigenous plant, growing to the height of one or two feet, possesses mild antispasmodic properties, and has been used as a substitute for valerian. Dose of the *powdered root*, gr. xv, three times a day. An infusion and tincture are also used; by precipitating the tincture an oleoresin is obtained, of which the dose is half a grain to three grains.

SCUTELLARIA—SKULLCAP.

The herb of Scutellaria lateriflora (*Nat. Ord.* Labiatæ), an indigenous perennial herb, growing to the height of one or two feet, with ovate, acute, dentate, petiolate, opposite leaves, and small pale-blue bowers, is considered by many American practitioners to possess valuable antispasmodic properties. An *infusion* (two troyounces to boiling water Oj) may be taken ad libitum: and a *fluid extract* is also used.

DRACONTIUM—SKUNK CABBAGE.

Dracontium fœtidum, Symplocarpus fœtidus, or Skunk Cabbage (*Nat. Ord.* Orontiaceæ), is an indigenous plant, growing in moist situations, which flowers in April and May, and afterwards sends up numerous large and luxuriant leaves. The fresh ROOT has a strong, fetid odor, and an acrid taste, but loses these properties by being kept. It is stimulant, antispasmodic, and narcotic, and is employed in hysteria, asthma, chronic catarrh, &c. Dose, gr. x to xx, gradually increased. It is also given in the form of *infusion*. The leaves are used in the country to keep up the discharge from blistered surfaces and to stimulate indolent ulcers.

The following vegetable substances, used as articles of diet, may be ranked also with antispasmodics.

I. THEA—TEA, the *dried leaves* of Thea Chinensis, (*Nat. Ord.* Ternstromiaceæ), an evergreen shrub, of China and Japan, whence the markets of the world are supplied. The most important constituents of tea are essential oil, (upon which the flavor depends), tannic acid, and a crystalline, volatilizable, nitrogenous alkaloid principle, termed *theina*.

II. CAFFEA—COFFEE, the seed of Caffea Arabica, (*Nat. Ord.* Cinchonaceæ), a small tree, which is a native of Southern Arabia and Abyssinia, and is cultivated in various tropical and semi-tropical countries. Coffee contains a nitrogenous principle, *caffeina* ($C_{16}H_{10}N_4O_4$), which is considered to be identical with *theina*, and two peculiar principles, one resembling tannin, termed *caffeo-tannic acid*, and *caffeic acid*. The volatile oil, upon which the flavor depends, is developed by roasting. Coffee may be used for the general indications of antispasmodics, and is besides especially efficacious in relieving the sopor produced by opium poisoning.

III. THEOBROMA—CHOCOLATE (noticed more at length under the head of demulcents—see *Oil of Theobroma*) contains a nitrogenous principle, *theobromia*, nearly identical in composition with caffeina ($C_{14}H_8N_4O_4$).

IV. Erythroxylon Coca—Coca.—The leaves of this plant, a shrub, about six feet in height, have long been used as a masticatory by the Indians in Peru, for the purpose of enabling them to undergo fatigue, hunger, and thirst. Statements have been recently made, of the medicinal efficacy of this substance as a nervous stimulant, in doses of half an ounce, in infusion. An alkaloid principle, termed *cocaina*, has been found in cocoa.

V. Guanara.—This occurs in chocolate-colored cylinders, which are worked up from the fruit of Paullinia Sorbilis (*Nat. Ord.* Sapindaceæ), a plant of Brazil, where it is used to make a common and highly esteemed beverage. It is said to contain twice as much *theina* as the best tea. It is recommended medicinally, as a tonic, astringent, and antispasmodic.

VI. Mate.—Under this name, the dried leaves of Ilex Paraguaiensis, a small tree or shrub of Paraguay, cultivated also in other parts of S. America, are extensively used as a beverage throughout the Atlantic region of that continent. *Paraguay tea*, as it is termed, has a balsamic odor and bitter taste, and contains a principle identical with *caffeina* and *theina*, and also tannic acid.

MOSCHUS—MUSK.

Musk is a peculiar CONCRETE SUBSTANCE obtained from Moschus moschiferus, the Musk Deer, an animal rather larger than the goat, and resembling the deer in its characters, which inhabits the mountainous portions of Central Asia. The musk-bag is found only in the male, and lies between the umbilicus and prepuce. It is an oval pod, about two and a half inches long, and one and a half broad, flat on one side, and convex and hairy on the other, and in the full-grown animal contains from ʒjss to ʒvj, of a liquid secretion, which, when dried, is musk. Two kinds are known in commerce, the China and the Russia Musk, the former of which is much the stronger.

Musk occurs in grains or lumps concreted together, of a reddish-brown color, and has usually some hairs of the pod mixed

with it. It has a powerful diffusive, aromatic odor, and a bitterish taste. It is inflammable, leaving a light spongy charcoal. On analysis, it yields ammonia and a variety of other constituents, but the odorous principle has not been isolated. It is partially soluble in water and alcohol, and completely so in ether.

Owing to its high price, musk is greatly sophisticated. Sometimes artificial pods are met with, which may be distinguished from the genuine by the absence of the remains of the penis and of an aperture in the middle of the hairy coat. The musk itself is more frequently adulterated, by mixture with dried blood, and a variety of substances. Indeed, little if any genuine musk is found in the shops.

Effects and Uses.—Musk is a powerful excitant and antispasmodic, without much effect on the cerebral functions. If a pure article could be obtained, it would have no superior as a direct antispasmodic in the treatment of essential nervous disorders—hysteria, epilepsy, chorea, and hiccough, and as a combined excitant and antispasmodic in the latter stages of typhus. But it is now a little prescribed, owing to the difficulty of procuring it good.

Administration.—It may be given in the form of bolus or emulson. Dose, gr. x, to be repeated every two or three hours.

An article, termed ARTIFICIAL MUSK, is made by the addition of one part of rectified oil of amber to three parts of nitric acid. It resembles musk both in sensible and medicinal properties, and has been prescribed in its stead, in the same dose.

CASTOREUM—CASTOR.

This is a peculiar CONCRETE SUBSTANCE, found in membranous follicles, which exist between the anus and external genitals of the Castor fiber, or Beaver. It occurs in the form of solid unctuous masses, contained in pairs of sacs about two inches in length, of a brownish-black color externally, and of a

reddish-brown color internally. It has a peculiar, penetrating, disagreeable smell, and a bitter, acrid, nauseous taste. It is soluble in alcohol and ether. Castor contains, with other matters, a *volatile oil*, a peculiar neutral crystalline substance, termed *castorin*, and *salicin*, the bitter principle of the willow. According to many authorities, the *oil* is a derivative of salicin.

Effects and Uses.—Castor is moderately excitant and antispasmodic, and is very analogous in its effects to musk. It is not much used. Dose of castor in substance, gr. x to gr. xx; of the *tincture* (two troyounces to alcohol Oij), f℥j to f℥ij.

OLEUM SUCCINI RECTIFICATUM—RECTIFIED OIL OF AMBER.

Amber, Succinum, is a sort of fossil resin found in various parts of the world, and comes to this country from the shores of the Baltic. It is a hard, brittle substance, usually translucent, and of a pale golden-yellow color, insipid, and inodorous, except when heated. By distillation, it yields an *oil* which, when rectified, is employed medicinally. The oil is nearly colorless at first, but gradually becomes brown, has a strong, peculiar odor, and a pungent, acrid taste. It is soluble in alcohol. An acid called *succinic* is also obtained from amber.

Effects and Uses.—Oil of amber is excitant and antispasmodic, and has been used in hysteria, epilepsy, tetanus, pertussis, and amenorrhœa. It is chiefly employed as an external application, and is a good remedy in pertussis and convulsions of children. Dose of the oil, gtt. v to gtt. xv. For external use, it may be mixed with three or four parts of olive oil and brandy, with one part of laudanum added.

OLEUM ÆTHEREUM—ETHEREAL OIL.

This substance, known also as *oil of wine*, is a result of the distillation of alcohol with a large excess of sulphuric acid. It is a volatile liquid, of a yellowish color and peculiar odor, very

sparingly soluble in water, but readily dissolved by alcohol or ether. It has antispasmodic properties, but is used in medicine only as an ingredient of the Compound Spirit of Ether.

SPIRITUS ÆTHERIS COMPOSITUS—COMPOUND SPIRIT OF ETHER.

This preparation, known as *Hoffman's Anodyne Liquor*, is a solution of ethereal oil (f℥vj), in ether (Oss), and alcohol (Oj). It is a volatile liquid, with a burning, slightly sweetish taste, and the peculiar odor of ethereal oil. It becomes milky on being mixed with water, owing to the precipitation of the ethereal oil.

Effects and Uses.—Hoffman's Anodyne has the antispasmodic and stimulant effects of ether, and derives additional tranquillizing and anodyne properties from the ethereal oil present. It is much used in hysteria, and is often added to laudanum, to prevent the nausea which the latter sometimes excites. Dose, f℥j to f℥ij, in sweetened water.

ORDER IV.—TONICS.

Tonics, called also corroborants, are medicines which produce a gradual and permanent increase of nervous vigor. It is only, however, in certain conditions of disease that they manifest this invigorating influence: as, in a state of health, they often act as irritants, or even nauseants. Their local effects are similar to their general effects. They exalt the nervous functions of the parts to which they are applied, and increase their firmness and density. When taken into the stomach they produce a twofold corroborant effect, improving the digestive powers by their local action, and strengthening the system generally by their cerebro-spinal influence.

Tonics differ from stimulants only in the more permanent character of their effects. The more powerful tonics are closely allied to the narcotics in their action, producing, in

overdoses, giddiness, loss of sight and of hearing, convulsions, delirium, and even death. And this analogy is further illustrated by the curative powers of tonics in the relief of painful and spasmodic diseases, as neuralgia, rheumatism, chorea, and epilepsy.

The articles of this class may be divided into *vegetable* and *mineral* tonics. The vegetable tonics are characterized by *bitterness;* and it is said that they owe their bitterness and medicinal activity to a principle which has been termed bitter extractive. It is doubtful, however, whether any such proximate principle has really been obtained. The mineral tonics unite astringent with tonic properties; and the preparations of iron produce a further corroborant effect, by increasing the red coloring matter of the blood.

The therapeutic application of tonics comprises a diversified range of diseases. They are employed as stomachics in dyspepsia, and as general corroborants in convalescence from acute diseases, in chronic affections accompanied by marasmus and cachexia, and in typhus and gangrene. But their most striking and valuble powers are shown in their febrifuge influence upon malarious diseases. The modus medendi here is obscure, but the curative agency is undoubtedly due to a powerful impression upon the central organs of the nervous system. The anti-neuralgic and antispasmodic properties of tonics have already been alluded to. They also enjoy considerable reputation in the treatment of chronic bowel-complaints, where they act by restoring tone to the debilitated intestinal tube; and, on the other hand, they are often useful as laxatives in torpid conditions of the alimentary canal.

VEGETABLE TONICS.

The vegetable tonics may be arranged into three sections, viz.: 1. The pure bitters. 2. The aromatic bitters, which contain a stimulant volatile oil, and are aromatic as well as tonic. 3. The astringent bitters, which contain tannic and

gallic acids, and are both astringent and tonic: this group contains cinchona, the most powerful and important of the vegetable tonics. The bitter principle is found also in many medicines belonging to other classes, as rhubarb, aloes, taraxacum, &c., and gives them tonic properties.

SIMPLE BITTERS.

QUASSIA.

Quassia is the WOOD of Simaruba excelsa (*Nat. Ord.* Simarubaceæ), a lofty tree of Jamaica and other West Indian islands. It is imported from the West Indies in billets of various sizes, which are found in the shops in the form of chips or raspings. Externally, it is covered with a smooth, brittle bark; the wood is white, but becomes yellowish by exposure. It has no odor, but an intense permanently bitter taste. Water and alcohol extract its virtues, which are said to depend on a neutral principle termed *quassin*.

The article originally known as Quassia was the root and wood of Quassia amara, a shrub of Surinam, but this does not now reach our markets. It is thought to have possessed much more decided tonic properties than the drug now found in commerce.

Effects and Uses.—Quassia is a mild tonic, free from stimulant or astringent effects, and is employed principally in dyspepsia, want of appetite, and other stomachic affections. It is much used to give additional bitterness to malt liquors. Dose, in *powder* ℈j to ʒj, three or four times a day; but the best form of administration is that of *infusion* (ʒij to water Oj), in doses of fʒjss to fʒiij. An *extract* (aqueous) is given in the dose of gr. v, but it is principally used as an excipient for the administration of the mineral tonics. Of the *tincture* (two troyounces to diluted alcohol Oij), the dose is fʒj to fʒij.

SIMARUBA.

Simaruba is the BARK of the ROOT of Simaruba officinalis (*Nat. Ord.* Simarubaceæ), a tall tree of Jamaica and many parts of South America. It occurs in long pieces of various sizes, which are much rolled or quilled, of a brownish-yellow color externally, and yellow internally. It contains a bitter principle, analogous to quassin, and resembles quassia in its medicinal effects.

COPTIS—GOLDTHREAD.

Coptis trifolia, or Goldthread (*Nat. Ord.* Ranunculaceæ), is a small, evergreen, herbaceous plant, resembling the strawberry-vine, with perennial creeping roots, slender stems, round, ter-

Fig. 8.

nate leaves, and a single small white flower, which appears through the spring till midsummer. It belongs to the northern regions of America and Asia, and abounds in swampy places

in Canada and New England. The parts used are the ROOTS, which should be gathered in autumn, and carefully dried. They are of a bright-golden color, and give the name by which the plant is commonly known. They contain the alkaloid *berberina*. The roots of a variety of coptis, derived from Assam in Asia, *Coptis teeta*, have been introduced into Europe; they possess analogous properties to those of *C. trifolia*.

Effects and Uses.—Goldthread is a pure and powerful bitter, similar in its effects to quassia, but much more palatable, and is a very good stomachic tonic. It is also employed in New England as a topical application in aphthous and other ulcerations of the mouth. It is usually given in the form of *tincture* (one troyounce to diluted alcohol Oj), in the dose of f℥j, and of *infusion* (half a troyounce to water Oj).

GENTIANA—GENTIAN.

Gentian is the ROOT of Gentiana lutea or Yellow Gentian (*Nat. Ord.* Gentianaceæ), a perennial plant of the mountainous parts of Central and Southern Europe, growing to the height of two or three feet, with broad, ovate, opposite leaves, and handsome whorled, yellow flowers. It is imported in cylindrical branched pieces, of various sizes, marked by transverse annular wrinkles and longitudinal furrows. Externally, it is yellowish-brown, internally, brownish-yellow, and of a spongy texture. Its odor in the fresh state is peculiar and disagreeable, but when dried, feeble; its taste is intensely bitter. Water and alcohol extract its virtues. It contains a peculiar oil and acid, pectin, sugar, and a bitter principle, termed *gentianin*. Other species of gentian are employed as substitutes for the yellow gentian.

Effects and Uses.—Gentian is a pure bitter, without either astringency or much aroma. In full doses it is more disposed to relax the bowels than the other simple bitters; and, like others of the vegetable tonics, in excessive doses, it is capable of producing narcotic effects. It is an admirable stomachic in dyspepsia and gastric disorders, and is also used in the various forms of constitutional debility.

Administration.—In the form of *powder*, the dose is gr. x to ʒss. But it is usually given in the form of *infusion* (half a troyounce to water fʒxiv, with diluted alcohol fʒij, and orange-peel and coriander, each ʒj); *tincture* (tinctura Gentianæ composita, gentian, two troyounces, orange-peel a troyounce, cardamon half a troyounce, to diluted alcohol Oij), in the dose of fʒj to fʒij; *extract*, in the dose of gr. x to ʒss; and *fluid extract*, in the dose of fʒss–j.

FRASERA—AMERICAN COLUMBO.

The ROOT of Frasera Walteri (*Nat. Ord.* Gentianaceæ), an elegant plant of our Southern and Western States, may be used as a substitute for gentian and columbo. Dose, ʒss–ʒj; or an *infusion* (a troyounce to boiling water Oj), may be given.

SABBATIA—AMERICAN CENTAURY.

Fig. 9.

Sabbatia angularis, American Centaury, or Centaury (*Nat.*

Ord. Gentianaceæ), is a very common annual indigenous plant, with an erect stem, one or two feet high, opposite ovate leaves, and numerous terminal flowers of a rich rose-color, nearly white in the centre. It is found in low meadow-grounds or neglected fields in most parts of the United States, and flowers in August and September. The WHOLE HERB is officinal, and should be gathered while in flower. It has a very bitter taste, and yields its virtues to both water and alcohol.

Effects and Uses.—Centaury is a pure bitter, with no astringency, and very little aroma. It is an excellent stomachic, and may be used also as a general corroborant. It is said to act as an emmenagogue when given in warm infusion, and, like the bitters generally, has had anthelmintic properties ascribed to it. The best form of exhibiting it is *infusion* (a troyounce, to boiling water Oj), of which the dose is a wineglassful when cool; of the *powder* ℥ss to ℥j may be given.

CALUMBA—COLUMBO.

Columbo is the ROOT of Cocculus palmatus (*Nat. Ord.* Menispermaceæ), a climbing plant of Mozambique, where it is known under the name of *Calumb*. The root consists of fleshy tubers, with numerous offsets, which are the portions used, the main root being too fibrous They are sliced, strung on cords, and dried in the sun; and are found in the shops in round pieces about a quarter of an inch thick, externally of a brown, wrinkled appearance, and internally yellow. The odor is slightly aromatic, and the taste very bitter. Owing to the starch which is found in columbo, it is liable to be worm-eaten. It contains, besides a large proportion of starch, a peculiar azotized substance, and two bitter principles, *colombin* and *berberina*. Water and alcohol take up its virtues; and, from its liability to attract moisture from the air, it should not be kept in the form of powder.

Effects and Uses.—Columbo is a very agreeable demulcent tonic, particularly acceptable to the stomach, and hence well

adapted to the convalescent stages of acute disorders of the bowels and of fevers. It is also a good preparation in the sickness of pregnant women, and is one of the best of the stomachics in all cases where there is unusual delicacy of the stomach. In its native country, it is much employed in the treatment of dysentery.

Administration.—The dose of the *powder* is gr. x to gr. xxx. It is best given in the form of *infusion* (half a troyounce to boiling water Oj, dose, f℥j to f℥ij), which should be used at once, as it is liable to spoil. Of the *tincture* (four troyounces to diluted alcohol Oij), f℥j to f℥iv may be given. Columbo is often combined with aromatics, iron, and alkalies, and is sometimes added to purgative mixtures.

Berberina, the alkaloid found in columbo, is widely diffused in the vegetable kingdom, and is obtained from numerous plants of the natural orders *Berberaceæ*, *Menispermaceæ*, and *Ranunculaceæ*, as barberry, yellow-root, hydrastis, goldthread, and others. It has been employed, in the form of muriate and sulphate, as a tonic and febrifuge, in doses of from one to ten grains.

CHIRETTA.

The HERB and ROOT of Agathotes Chirayta (*Nat. Ord.* Gentianaceæ), an East Indian plant, have been introduced into Europe, under the name of Chiretta or Chirayta, where it now ranks among the best simple bitters. It contains a peculiar bitter neutral substance, termed *chiratin*, ($C_{52}H_{48}O_{30}$); in medicinal properties, it resembles gentian, and may be used in the same way.

XANTHORRIZA—YELLOW-ROOT.

The ROOT of Xanthorriza Apiifolia (*Nat. Ord.* Ranunculaceæ), an indigenous shrub, of our Southern and Western States, is a good simple bitter, which agrees very well with the stomach.

AROMATIC BITTERS.

SERPENTARIA—VIRGINIA SNAKEROOT.

The ROOTS of several species of Aristolochia are known under the name of Virginia Snakeroot. The most familiar is A. serpentaria (*Nat. Ord.* Aristolochiaceæ), an herbaceous

Fig. 10.

indigenous plant, with a perennial root, composed of numerous slender fibres, arising from a knotty, brown head, one or more stems, eight or ten inches in height, heart-shaped, pointed, yellowish-green leaves, and purple, tubular flowers, springing up close to the root. It grows in our Southern and South-

eastern States, in shady woods and on hill-sides, flowering in May and June; but from the great demand for the roots, it has become scarce. A. reticulata is a variety found in the South-western States.

Virginia Snakeroot is found in the shops, in tufts of long, slender, matted fibres, attached to a knotty, rugged head. They are brittle, and of a yellowish-brown color. The odor is aromatic and agreeable; the taste somewhat pungent, bitter, and aromatic. Water and alcohol extract its virtues, which depend on the presence of a volatile oil and a bitter principle. The roots of A. reticulata are very commonly substituted for those of A. serpentaria, from which they differ only in the larger size of their fibres. They are quite equal to the latter, and are even thought to contain a larger proportion of volatile oil.

Effects and Uses.—Virginia Snakeroot is a combined stimulant and tonic, with diuretic or diaphoretic properties, according to the mode of its administration. It is much used in the latter stages of fevers, and in other acute diseases, and is frequently combined with Peruvian bark, in the treatment of intermittents. The proper form of administration is that of *infusion* (half a troyounce to boiling water Oj), in doses of f℥j to f℥ij, repeated. Of the *tincture* (four troyounces to diluted alcohol Oij), the dose is f℥j to f℥ij; of the *fluid extract*, f℥ss–f℥j. *Huxham's Tincture of Bark* contains Virginia Snakeroot.

ANTHEMIS—CHAMOMILE.

Anthemis nobilis, or Chamomile (*Nat. Ord.* Asteraceæ), is a small, herbaceous, trailing European plant, cultivated extensively both in Europe and this country. The FLOWERS are described by the U. S. Pharmacopœia as the portion used, but the ENTIRE HEADS are really the commercial article. The flowers consist of small spheroids, with convex, yellow disks, and numerous white, spreading rays. By cultivation they become

double. In Europe the single heads are preferred, as the aromatic properties reside in the disks, which are larger in the single-flowered wild plants; but in this country, the cultivated, double heads, which are not inferior in tonic virtues, are used. Chamomile flowers have a bitter, aromatic taste, and a strong, peculiar odor, both of which are imparted to water and alcohol. They contain a volatile oil, bitter extractive, and a little tannic acid.

Effects and Uses.—Chamomile, in small doses, is a mild, agreeable aromatic tonic, and in large doses, acts as an emetic. The cold infusion is much employed as a stomachic, and the hot infusion is given to aid the operation of emetics. The flowers, boiled in warm water, form a good fomentation to inflamed parts. The usual form of administration is the *infusion* (half a troyounce to water Oj). Dose, as a stomachic, f℥ij, two or three times a day, cold; as an emetic, hot, ad libitum.

Cotula (*Mayweed*). Anthemis cotula, Wild chamomile, or Mayweed (*Nat. Ord.* Asteraceæ), an herbaceous plant, indigenous in Europe, but extensively naturalized in the United States, resembles chamomile very closely, both in botanical characters and in properties, and is used as a substitute for it in domestic practice.

Matricaria (*German Chamomile*). The heads of Matricaria chamomilla (*Nat. Ord.* Asteraceæ), an annual European plant, possess properties very similar to those of chamomile. They are considerably smaller than common chamomile, and have a larger proportion of disk florets compared with those of the ray. They are not much employed in this country.

EUPATORIUM—THOROUGHWORT.

Eupatorium perfoliatum, Boneset, or Thoroughwort (*Nat. Ord.* Asteraceæ), is a very common indigenous plant, growing in wet grounds in every part of the United States. It has a perennial

root, with numerous herbaceous stems, from two to five feet high, long, narrow leaves, perforated by the stems, and numerous white FLOWERS, which form a flattened summit to the plant.

Fig. 11.

These appear in August, continuing in bloom till October, and with the LEAVES, are the officinal portion. They have a faint odor, a strongly bitter taste, are soluble in water or alcohol, and contain a peculiar bitter principle, gum, tannic acid, resin, salts, and other matters.

Effects and Uses.—Thoroughwort is a stimulant tonic, diaphoretic, and expectorant, and in large doses proves emetic and laxative. It is a good stomachic in dyspepsia, and, from its combined corroborant, expectorant, and diaphoretic properties, is an excellent remedy in the latter stages of pneumonia and bronchitis. It is also used with good effect in rheumatism, and in intermittent, remittent and typhoid fevers. It should

be given in *infusion* (a troyounce to boiling water Oj), f℥ij of which may be taken cold, as a stomachic, three or four times a day, and in freer warm draughts as a diaphoretic.

ABSINTHIUM—WORMWOOD.

The TOPS and LEAVES of Artemisia Absinthium, or Wormwood (*Nat. Ord.* Asteraceæ), a European plant, naturalized in New England, are ranked among the aromatic bitters, but are not now much employed. They may be given in *infusion* (a troyounce to boiling water Oj).

MAGNOLIA.

The BARKS of Magnolia glauca, Magnolia acuminata, and Magnolia tripelata (*Nat. Ord.* Magnoliaceæ), indigenous trees, remarkable for the beauty of their foliage, and the size and fragrance of their flowers, are officinal, and rank with the aromatic bitters. The barks of the trunk, branches, and root, are alike officinal; but those of the last are the most active. They contain a volatile oil, a green resin, and a peculiar crystallizable bitter principle. The aromatic property is impaired by drying, and is lost when the barks are long kept.

They are used as gentle stimulant tonics and diaphoretics, in the low stages of fever, rheumatism, &c. An *infusion* may be given, but the best solvent is diluted *alcohol.*

LIRIODENDRON—TULIP-TREE BARK.

The BARK of Liriodendron tulipifera, the Tulip-tree, or American Poplar (*Nat. Ord.* Magnoliaceæ), the well-known pride of the American forest, remarkable for its size, foliage, and beautiful tulip-shaped flowers, closely resembles those of magnolia in its medicinal properties, but is less aromatic and more stimulant. It is said to contain a peculiar principle,

termed *liriodendrin*. It may be given in *powder*, in the dose of ℈j to ʒij; and in *infusion*, *decoction*, and *tincture*.

ANGUSTURA—ANGUSTURA BARK.

Angustura BARK is derived from Galipea officinalis (*Nat. Ord.* Rutaceæ), a small tree of the district of country bordering on the Orinoco, in South America. It occurs in pieces of various lengths and sizes; sometimes flat, sometimes slightly curved, but rarely entirely quilled. Externally, it is of a light-gray color, and is covered with lichens, with a soft, spongy epidermis, which is readily scraped off; internally, the color is yellowish-brown. It has a disagreeable smell, and a bitter, aromatic, somewhat pungent taste. It imparts its virtues to water and alcohol, and contains a volatile oil and a bitter principle, termed *cusparin*. The bark of Strychnos nux vomica has been sometimes mixed with Angustura bark, and is thence known as *false angustura bark*.

Effects and Uses.—Angustura bark is a stimulating tonic, and in large doses acts on the stomach and bowels. From its liability to adulteration with the bark of strychnos nux vomica, it has fallen into disuse, and it has no superiority over serpentaria and others of the indigenous aromatic bitters. Dose, in *powder*, gr. x to ʒss; of the *infusion* (half a troyounce to boiling water Oj), fʒij, repeated.

CASCARILLA.

This is the BARK of Croton Eleuteria (*Nat. Ord.* Euphorbiaceæ), a small tree of the Bahamas and other West India islands. It occurs sometimes in the form of small, thin fragments—sometimes in that of rolled pieces, one or two inches long, occasionally longer, and varying in size from that of a quill to that of the little finger. It is usually covered with a white rugous epidermis, and is of a brown color beneath. It has a warm, spicy, and bitter taste, and an aromatic, agreeable

odor, which is particularly fragrant when it is burned. It yields its properties to alcohol, and partially to water; and contains volatile oil, resin, and a bitter principle, called *cascarillin*.

Effects and Uses.—Cascarilla is a very pleasant aromatic bitter, causing neither vomiting nor purging, and hence agreeing very well with the stomach. It may be given in *powder* in the dose of ℈j to ʒss; but this is a less agreeable form than the *infusion* (a troyounce to boiling water Oj), of which the dose is fʒij.

CANELLA.

This is the BARK of Canella alba (*Nat. Ord.* Meliaceæ), a large tree of the West Indies and South America. It comes in quilled pieces of a whitish-yellow color, or in flat fragments, which are thicker and darker. It has an aromatic odor, and a warm, pungent, aromatic, and somewhat bitter taste. It imparts its virtues to alcohol, and partially to water; and contains volatile oil, resin, bitter extractive, gum, &c.

Effects and Uses.—An aromatic tonic, little employed except in combination. *Pulvis Aloës et Canellæ* (*Powder of Aloes and Canella*), popularly known as *hiera picra*, consists of aloes *four parts*, canella *one part;* dose, gr. x to ℈j.

ACHILLEA—YARROW.

Achillea Millefolium, Milfoil, or Yarrow (*Nat. Ord.* Compositæ Senecionideæ) a perennial herb, common to the old and new continents, growing to the height of twelve or eighteen inches, with doubly pinnate, minutely divided leaves, and whitish flowers, possesses mild stimulant tonic properties, with some astringency. The U. S. Pharmacopœia directs the HERB and FLOWERS of this plant, but the TOPS and LEAVES are the portion to be employed. Of the *infusion*, made in the proportion of an ounce to the pint, a wineglassful or more may be given. It

yields a *volatile oil*, which has been used in the dose of 20 or 30 drops.

ANGELICA.

The ROOT of Angelica Archangelica (*Nat. Ord.* Apiaceæ), a plant of the Northern and mountainous sections of Europe, is used as a stimulant tonic, in the dose of ʒss–ʒj; or an *infusion* may be given.

ASTRINGENT BITTERS.

CINCHONA—PERUVIAN BARK.

The name of Cinchona (derived from the Countess del Cinchon, wife of a viceroy of Peru) is applied to the BARK of different species of Cinchona (*Nat. Ord.* Cinchonaceæ), large trees which grow in the mountainous regions of the western portions of South America, from the nineteenth degree of south latitude to about the tenth degree of north latitude. Three principal varieties of cinchona are known in commerce: CINCHONA FLAVA (*Yellow Bark*), called in commerce *Calisaya Bark*, derived from Cinchona Calisaya; CINCHONA PALLIDA (*Pale Bark*), called in commerce *Loxa* and *Lima Bark*, derived from Cinchona Condaminea and Cinchona Micrantha; and CINCHONA RUBRA (*Red Bark*), derived from Cinchona Succirubra.

Peruvian Bark is brought to the United States from the Pacific ports of South America. It is obtained by stripping the trunks and branches of the Cinchona trees during the dry season, and is dried by exposure to the sun, during which process the smaller pieces usually become quilled.

1. The *Yellow* or *Calisaya Bark* comes both in quilled and flat pieces. The former are from three or four inches to a foot and a half long, from a quarter of an inch to two or three inches in diameter, and of variable thickness. They have a brownish epidermis (with longitudinal wrinkles and transverse fissures), which possesses none of the virtues of the

bark. The bark itself is one or two lines thick, compact, of a short, fibrous texture, and when broken presents shining points. The flat pieces, which are derived from the larger branches and trunk, are usually destitute of epidermis, are more roughly marked externally, and are of a browner hue than the quilled pieces. They are also less compact, less bitter, and of less medicinal virtue. The yellow bark is distinguished from the other barks by its much more bitter taste; its comparative freedom from astringency; its brownish-yellow, somewhat orange color, which is still brighter in the powder; and by *containing a large proportion of quinia with very little cinchonia.*

2. The *Pale Bark* comes in cylindrical pieces of variable length, sometimes singly, sometimes doubly quilled, from two lines to an inch in diameter, and from half a line to two or three lines in thickness—the best kinds being about the size of a goose-quill. Their exterior surface is rough, marked with fissures, and of a grayish color, owing to adhering lichens. Their interior surface is of a cinnamon color, and, in the finer sorts, smooth. The color of the powder is a pale fawn. The taste is moderately bitter, and somewhat astringent; the odor feeble, but rather aromatic in the powder and decoction. The pale barks *contain a much larger proportion of cinchonia than of quinia;* and, from their yielding little quinia, have fallen into disuse in the United States.

3. The *Red Bark* usually comes in large, thick, flat pieces; sometimes also in quills from half an inch to two inches in diameter. They are covered with a reddish-brown, rugged epidermis, beneath which is a dark-red, brittle, and compact layer, the interior parts being woody and fibrous, and of a lively brownish-red color. The taste of red bark is bitter and astringent; its odor not different from that of the other barks; its powder is reddish. It *contains considerable quantities both of quinia and cinchonia.*

Under the name of CARTHAGENA BARKS, several common varieties of cinchona were long brought to this country from the northern Atlantic ports of South America. They were of

inferior quality, and were therefore not recognized by the Pharmacopœias; but, since the reduced supply and consequent high price of the Calisaya bark, large quantities of very good bark have been imported from New Granada, and are now used in the manufacture of quinia, under the name of Colombian barks.

Within a few years, the cultivation of several varieties of Cinchona trees has been successfully introduced into Southern India; and valuable specimens of red bark (the product of C. Succirubra), equal to that of South America, have been sent to Europe.

Chemical Constituents.—The most important constituents of cinchona are two alkaline principles, termed *quinia* and *cinchonia*, which exist chiefly in combination with an acid called *kinic*. These alkalies are found in different proportions in the different barks, quinia being obtained from the *yellow* bark most abundantly, cinchonia from the *pale* bark, and the two principles in about equal proportion from the *red* bark. Two other valuable alkaloids, *quinidia* and *cinchonidia*, are found (also as *kinates*), most abundantly in the *pale* and *Carthagena* barks; but, to a certain extent, in all. Other principles found in cinchona are cinchotannic acid, coloring matter, kinovic acid, starch, fatty matter, kinate of lime, lignin, &c. Gum is found in the pale bark, but not in the yellow or red bark.

Quinia is obtained in the following manner: Powdered yellow bark is boiled in water acidulated with muriatic acid, by which the alkali is separated from its combination with kinic and other acids, to form a soluble muriate. By the addition of lime, this salt is decomposed, and quinia precipitated. It is separated from insoluble impurities by digestion in boiling alcohol, and, after being concentrated, is decolorized by means of animal charcoal. Or, it may be obtained by heating the sulphate with an alkaline solution. It occurs in the form of fine crystalline needles of a silky lustre, or as a loose white powder; it is inodorous, very bitter, sparingly soluble in cold water, but somewhat more readily so in hot water, readily soluble in alcohol, ether, and the fixed and volatile oils. It unites with acids to form salts, the most important of which is

the officinal salt, the sulphate. Its composition is $C_{40}H_{24}N_2O_4$. Quinia and its salts may be distinguished from all other vegetable alkalies and their salts (excepting quinidia), by striking an emerald-green color, when heated first with solution of chlorine and then with ammonia. *Cinchonia* is a white crystalline substance, less bitter than quinia, almost insoluble in cold water, very soluble in boiling alcohol, and slightly soluble in ether and the fixed and volatile oils. Its composition is $C_{40}H_{24}N_2O_2$. It is distinguishable from quinia by striking a white precipitate, when chlorine water and afterwards ammonia are added; with ferrocyanide of potassium, a yellowish-white precipitate ensues. Cinchonia being insoluble in ether, while quinia is soluble in that menstruum, the latter may by this means be readily separated from the former alkaloid. The medicinal properties of quinia and cinchonia are analogous, and the sulphate of cinchonia is now officinal. *Quinidia* is isomeric with quinia, but more crystallizable and less soluble in ether; its salts strike a white precipitate with solution of iodide of potassium. *Cinchonidia* is isomeric with cinchonia. It is usually found mixed with quinidia, the mixture being known as *commercial quinidia*. The commercial sulphate of quinidia (which is more soluble in water and alcohol than the sulphate of quinia), may be used as a substitute for the latter salt.

Incompatibles.—The alkalies and alkaline earths precipitate the alkaline principles of cinchona; tannic acid, and the tincture and compound solution of iodine, form with them insoluble compounds.

Physiological Effects.—The *topical* effects of cinchona are slightly irritant, and, from the tannic acid which it contains, astringent. Its *constitutional* action upon persons in health, results in a disordered condition of the stomach, and of the vascular and cerebro-spinal systems, as shown by gastro-enteric irritation, fever, headache, and giddiness. But, in persons suffering from debility, it proves a most energetic stomachic and corroborant; and over certain morbid conditions, as malarious and other fevers, it exercises a control more striking than is shown by any other medicinal agent, in the treatment of diseases.

Medicinal Uses.—The most important therapeutic employment of bark is as a febrifuge in the treatment of fevers of a malarious origin. Its efficacy in these diseases was first made known to the world by the Jesuit missionaries in Peru, from whom it was called *Jesuit's powder.* The type of malarious fever in which the powers of bark are most strikingly displayed, is *intermittent;* the non-malignant and uncomplicated forms of which it rarely if ever fails to control. It may be given in these cases almost from the very onset of the attack, unless contraindicated by the presence of gastric irritability, which must be first removed by an emetic or mercurial purge. In *remittent fevers*, bark is scarcely less useful than in *intermittents;* and most physicians who practise in malarious districts, now concur in recommending its exhibition in these fevers, as soon as it can be borne well by the stomach, without waiting for a remission. In the *pernicious* or *congestive* forms of intermittent and remittent fevers, the early administration of large doses of bark or its preparation, the sulphate of quinia, in combination with stimulants, is imperatively demanded; and the hypodermic injection of the sulphate of quinia may here be necessary. As a prophylactic against malarious fever, the use of the preparations of bark is very efficacious. In the varieties of typhus, including that termed cerebro-spinal meningitis, the salts of quinia, in full doses, are generally resorted to, in conjunction with abundant alcoholic stimulation and nourishment. In yellow fever, the declining stages of typhoid fever, the malignant exanthemata, gangrene, malignant erysipelas, carbuncle, extensive suppurations, the typhoid forms of diseases generally, the hectic of phthisis, acute rheumatism, diarrhœa, dysentery, and cholera, and various disorders of the nervous system, as neuralgia, tetanus, and chorea, bark and its preparations are constantly employed. It is also much used as a stomachic and general tonic, but where gastric susceptibility exists, as in convalescence from acute diseases, some of the simple bitters are preferable. *Topically*, bark is employed as an astringent and antiseptic.

Administration.—The use of bark, in *powder*, since the dis-

covery of sulphate of quinia, has been very much abandoned, owing to its bulk and disagreeable taste. When exhibited in this form, half a troyounce to an ounce is the dose as a *febrifuge*, given usually in divided amounts; as a tonic, ʒj. The following officinal preparations are employed: *decoction* (a troyounce of yellow or red bark to Oj of water, to be boiled for ten minutes, and aromatic sulphuric acid fʒj may be afterwards added), dose, fʒij, repeated; *infusion* (a troyounce of yellow or red bark to water Oj, to which aromatic sulphuric acid fʒj may be added), dose fʒij repeated; *extract* (of yellow bark), dose gr. x to gr. xxx, equivalent to ʒj of bark; *fluid extract* (yellow), dose, fʒij, equal to ʒj of bark; *tincture* (six troyounces of yellow bark to diluted alcohol Oij), dose, fʒj to fʒiv; *compound tincture* or *Huxham's tincture* (containing red bark four troyounces, bitter orange-peel three troyounces, serpentaria three hundred and sixty grains, saffron and red saunders each one hundred and twenty grains, to diluted alcohol Oijss), dose, fʒj to fʒiv. In prescribing bark, opium or port wine is often given with it, when it acts on the bowels. It is also occasionally combined with serpentaria. And, when the stomach will not retain it, it has been used externally in the form of *cataplasmata*, *pediluvia*, *bark jackets*, &c., though in such cases it may be administered by the rectum, and the endermic or even the hypodermic exhibition of the sulphate of quinia may be resorted to.

Quiniæ Sulphas (*Sulphate of Quinia*). This salt is prepared by treating quinia (as obtained from yellow bark in the process described at p. 114), with sulphuric acid. It occurs in fine, silky, rather flexible, needle-shaped crystals (interlaced among one another, or grouped in small starlike tufts), which are odorless, very bitter, and slightly efflorescent. It is soluble in boiling water, alcohol, and the diluted acids, very slightly soluble in ether and in cold water, but, by the addition of sulphuric acid, it is converted into a more soluble neutral sulphate. The officinal sulphate is chemically a *disulphate* or *subsulphate*, consisting of two equivalents of base to one of acid.

Various substances are mixed as adulterations with the sulphate of quinia. They may be detected by adverting to their relative solubility in different menstrua, as compared with the sulphate, or by chemical tests. Thus, gum and starch are left behind by alcohol; salicin becomes red on contact with sulphuric acid, &c.

Effects and Uses.—The effects of sulphate of quinia on the system are the same as those of Peruvian bark, and, from its being less apt to disagree with the stomach, it has to a great extent superseded the use of the latter. In large doses it produces headache, ringing of the ears, and sometimes vertigo, amaurosis, deafness, delirium, dilatation of the pupils, and other evidences of a powerful action on the cerebro-spinal system.

Administration—The ordinary dose of the sulphate of quinia, as a febrifuge, is gr. xvi, equal to about ℥j of bark, but as much as twenty grains, and even more, are often required; as a general tonic, gr. j to gr. vj. It may be given in pill, or dissolved in some aromatic water, by the aid of aromatic sulphuric acid; also as an enema, or hypodermically. The solution has been used externally in gonorrhœa, &c. Many other salts of quinia than the sulphate have been introduced into practice, but they possess no advantage over the officinal salt.

Quiniæ Valerianas (*Valerianate of Quinia*), is obtained by dissolving freshly precipitated quinia in diluted valerianic acid. It occurs in transparent or white rhomboidal crystals, of the peculiar odor of valerianic acid, and an acrid, bitter taste. Soluble in alcohol and ether, and partially soluble in water. It fulfils the indications of quinia and valerianic acid, and is therefore especially useful in nervous disorders.

Crude Quinia is the impure quinia obtained from the manufacturer, before separation from the insoluble impurities. It is a soft solid, of resinous aspect, nearly free from bitterness, and may be given to children in the same doses as the sulphate.

Quinoidia, *quinoidine*, or *amorphous quinia*, is a substance obtained by precipitation, with an alkaline carbonate, from the mother liquor left after the preparation of sulphate of quinia. When moderately heated, it appears as a resinous mass, of a

yellowish-white or brownish color, which, according to Liebig, bears the same relation to ordinary quinia that uncrystallizable sugar bears to the crystallizable. The quinia in this preparation is thought to be converted, by the action of heat, into an isomeric alkaloid, termed *quinicia;* and by the same action, cinchonia is converted into an isomeric alkaloid, termed *cinchonicia.* It is considered equally efficacious with quinia, but requires doses rather larger than the sulphate of quinia, than which it is much more economical.

Cinchoniæ Sulphas (*Sulphate of Cinchonia*), is made from the mother waters remaining after the crystallization of sulphate of quinia. Being the most soluble of the sulphates of the four alkaloids found in bark, it remains in solution after the sulphate of quinia, and the mixed sulphate of cinchonidia and quinidia, have crystallized out. From the mother waters, it is precipitated by solution of soda, then washed with alcohol, next reconverted into a sulphate, and boiled with animal charcoal to decolorize it. It occurs in short, oblique, shining prisms, of a very bitter taste, more soluble in water than the sulphate of quinia, readily soluble by alcohol, and sparingly so by ether. It is a disulphate. It is now admitted to have the same remedial properties as the sulphate of quinia, but requires rather larger doses.

CORNUS FLORIDA—DOGWOOD.

Cornus Florida, or Dogwood (*Nat. Ord.* Cornaceæ), is an indigenous tree, found in most parts of the United States, and growing in the Middle States to the height of from fifteen to twenty feet. Its flowers are remarkable for large four-leaved white or pinkish involucres, which appear with us in May. The officinal portion is the bark, that of the root being preferred. It occurs in pieces of various sizes, more or less rolled, of a reddish-gray color, with occasionally a fawn-colored epidermis. Its odor is slight; its taste bitter, astringent, and slightly aromatic. It yields its virtues to water and alcohol,

and contains resin, a peculiar bitter principle, tannic and gallic acids, &c.

Fig. 12.

Effects and Uses.—Dogwood is deservedly esteemed the best substitute for cinchona among the native astringent bitters. It is somewhat stimulant, and not unfrequently disorders the stomach. Dose, in *powder*, ℈j to ʒj; of the *decoction* (a troy-ounce to water Oj), fʒij may be given.

SALIX—WILLOW.

The BARK of Salix alba, or the White Willow (*Nat. Ord.* Salicaceæ), is ranked among the astringent bitters. It is little employed, however, except in the form of *salicine*, its active principle ($C_{26}H_{18}O_{14}$), which consists of white, slender, silky crystals, inodorous, but very bitter, soluble in water and alco-

hol, but not in ether. It has been used as a substitute for the sulphate of quinia, but it is very inferior to it as a febrifuge. As a general tonic, however, it is useful, and may be given in the dose of from gr. x to gr. xxx. The sulphate of quinia is often adulterated with salicine, but the fraud may be detected by the addition of concentrated sulphuric acid, which strikes a blood-red color with salicine.

PRUNUS VIRGINIANA—WILD-CHERRY BARK.

The wild-cherry has long been known under the name of Prunus Virginiana, which is still retained by the Pharmacopœia. This name, however, belongs to another tree, the choke-cherry; and the wild-cherry is now properly distinguished as Cerasus serotina (*Nat. Ord.* Drupaceæ). It is a large indigenous tree, attaining a great height and size in the Southwestern States, but usually with us about twenty-five to thirty feet high. The trunk is covered with a rough blackish bark, which detaches itself semicircularly; the leaves are ovate, oblong, and acuminate; the flowers, which appear in May, are white, and are followed by fruit about the size of a pea, of a purplish black color, and a not unpleasant bitterish taste. The medicinal portion is the INNER BARK of the root and tree, the former of which is the more active. It is found in the shops, in pieces of various lengths and sizes, deprived of the epidermis and slightly curved, of a reddish-brown color, and a bitter aromatic taste.

It contains a bitter principle, resin, starch, and tannic and gallic acids, and yields on distillation a volatile oil, nearly identical with the oil of bitter almonds, which does not pre-exist in the bark, but is formed by the action of water on amygdalin through the agency of an albuminous principle termed emulsin, as in the bitter almond. The leaves also yield this oil. Boiling water impairs the virtues of the bark.

Effects and Uses.—Wild-cherry bark is tonic, with some astringency, and at the same time exercises a sedative influence

on the nervous and circulatory systems, owing to the hydrocyanic acid, which is developed in it. It is used with excellent effect as a sedative corroborant in various forms of pulmonary irritation, particularly in the latter stages of pneumonia, and in the hectic of phthisis. It is also a useful stomachic and tonic in a variety of cases. The proper form of administration is the *infusion* (half a troyounce to cold water Oj), in the dose of f℥ij twice or thrice daily. Of the *fluid extract* (of which a fluidounce represents half an ounce of the bark), the dose is f℥j–ij. The *syrup* is made by percolating five troyounces of the coarsely powdered bark with water till a pint of filtered liquor is obtained, and afterwards adding twenty-eight troyounces of sugar; it is an agreeable preparation; dose, f℥ss.

NECTANDRA.

The BARK of Nectandra Rodiei (*Nat. Ord.* Lauraceæ), the Greenheart tree, a large tree of Guiana, and the neighboring countries of South America, has, within a few years, been introduced into medicine, under the name of *bebeeru* bark. It occurs in large, flat, heavy pieces, one to two feet long, from two to six inches broad, and three or four lines thick, of a grayish-brown color on its outer surface, and a dark cinnamon on the inner. It has an intensely bitter, somewhat astringent taste, and contains tannic acid, resin, gum, &c., and two alkaloids, which have been isolated, termed *bebeerina* ($C_{18}H_{21}O_3N$), and *nectandra* ($C_{20}H_{23}O_4N$). Bebeeru bark is employed as a febrifuge and tonic in South America, and the *sulphate of bebeerina* has been used in Europe and this country with some success in the treatment of intermittent fevers. The full dose is ℈j–℥j.

The ROOTS of Geum rivale, or Water Avens, and Spiræa tomentosa, or Hardhack (*Nat. Ord.* Rosaceæ), and the BARK of Prinos verticillatus, or Black Alder (*Nat. Ord.* Aquifolaceæ), are indigenous astringent tonics of considerable power.

PEPSINE.

In connection with the subject of stomachic tonics, this article is entitled to brief mention. It is prepared from the rennets either of the calf, sheep, or pig, taken from the animal as soon as killed. These are washed under a thin stream of water. The internal membranes are then carefully scraped off, and macerated in water for two hours at a temperature of 59° F., and then strained through a coarse cloth. The pepsine in the solution is then precipitated by acetate of lead, allowed to settle, and the supernatant liquid poured off; a current of sulphuretted hydrogen is passed through the semi-liquid deposit, which precipitates the lead in the form of sulphuret. The pure pepsine remains in solution, which is then filtered, and evaporated to dryness at a uniform temperature of 113° F. Pepsine is now a good deal used in dyspepsia, and may be given in doses of 15 grains before each meal, suspended in syrup of orange-peel or other syrup, to disguise its disagreeable taste. It has been applied externally, in strong solution, to dissolve the exudation of diphtheria.

MINERAL TONICS.

FERRI PRÆPARATA—PREPARATIONS OF IRON.

The preparations of Iron (Ferruginea), termed also *Chalybeates* and *Martial* preparations, are the most important of the mineral tonics. Besides their local tonic-astringent effect and their general corroborant action on the cerebro-spinal system, which they possess in common with the other mineral tonics, they exercise a restorative influence on the composition of the blood, by increasing the number of its coloring particles, and the amount of its solid constituents. Their effects are best observed in conditions of the system in which there is a want of these elements of the blood. Under the use of chalybeates in such cases, while the digestive functions are promoted, the pulse becomes fuller and stronger, the skin assumes a healthy

tint, the lips and cheeks become more florid, the temperature of the body is increased, and the muscular strength is greatly invigorated. On the other hand, the administration of the ferruginous preparations in health, or too long continued, produces symptoms of plethora, vascular excitement, and a tendency to congestion and hemorrhage.

The diseases in which chalybeates are most serviceable are those which depend on a deficiency of the red corpuscles of the blood, as the various forms of *anæmia*, particularly where this is connected with irregularity of the uterine functions; also, scrofula, tuberculosis, and cachectic conditions of the system, characterized by a pale flabby condition of the solids. Many forms of nervous disorder, as neuralgia, chorea, hysteria, and epilepsy, are very decidedly controlled by the preparations of iron, and they probably constitute the best remedies in these affections, when attended with anæmia. Several of the preparations of iron are also much employed both as stomachics and astringents.

The following are the officinal preparations of iron:

Ferrum Redactum (*Reduced Iron*). Metallic iron is obtained for medicinal purposes in the form of an impalpable powder, by reducing the sesquioxide (officinally subcarbonate) by passing a stream of hydrogen gas over it. It is a light, tasteless, insoluble iron-gray powder, and should be kept in a well-stoppered bottle, owing to its great liability to oxidation. This preparation, sometimes called Quevenne's Iron, is a mild chalybeate, and is a favorite prescription with many practitioners, in the treatment of chlorosis and other varieties of anæmia. Dose, gr. v to gr. x three times a day, in the form of pill, made with sugar and gum; it is sometimes prepared with chocolate in the form of lozenges.

Ferri Oxidum Hydratum (*Hydrated Oxide of Iron*). This preparation (Fe_2O_3+2HO) is made by precipitating the sesquioxide from its combination in any tersalt of iron by means of ammonia. Officinally, the tersulphate of iron is employed for this purpose. When dry it is a reddish-brown powder, and is not considered an eligible preparation for medicinal use. It is

furnished in the form of a soft, moist, reddish-brown magma, for use as an antidote to arsenious acid.

Ferri Oxidum Saccharatum. The *Saccharated Oxide of Iron* is not officinal, but has lately been introduced as a chalybeate, and also as an antidote to arsenious acid. It is prepared by dissolving iron wire in nitric acid, adding sugar, and afterwards sugar dissolved in water of ammonia, and finally precipitating with alcohol and again mixing with sugar. It is a dark-brown inodorous, tasteless powder, readily soluble in water and diluted alcohol ($C_{12}H_9O_9+2Fe_2O_3+6HO$, containing 43.59 pr. ct. Fe_2O_3). Dose, gr. v to gr. xxx three times a day.

Ferri Subcarbonas (*Subcarbonate of Iron*). This salt is obtained by the double reaction of solutions of sulphate of iron and carbonate of soda. It is at first a white precipitate; but by exposure to the air it becomes greenish, and afterwards rust-colored, being converted nearly entirely into the *sesquioxide* by the absorption of oxygen, and the evolution of carbonic acid. It has a disagreeable, slightly styptic taste, is insoluble in water, but readily dissolves in hydrochloric and sulphuric acids, and carbonic acid water. It is one of the most valuable of the ferruginous compounds, free from local irritation, and readily dissolved in the fluids of the stomach; and is much employed in chlorosis, chorea, neuralgia, and even pertussis and tetanus. Dose, gr. v to gr. xxx, three times a day.

Trochisci Ferri Subcarbonatis (*Troches of Subcarbonate of Iron*), are made with subcarbonate of iron five troyounces, vanilla sixty grains, sugar fifteen troyounces, and a sufficient quantity of mucilage of tragacanth—the mass to be divided into troches, each weighing twenty grains; each lozenge contains about five grains of the subcarbonate.

Emplastrum Ferri (*Plaster of Iron*), is made with subcarbonate of iron three troyounces, lead-plaster twenty-four troyounces, and Burgundy pitch six troyounces.

Pilulæ Ferri Carbonatis (*Pills of Carbonate of Iron*).—*Vallet's Ferruginous Pills.* To protect the carbonate of iron from oxidation, it is prepared (as in the process last described) by dissolving the reacting salts in weak syrup instead of water:

honey and sugar being afterwards added, to preserve it unaltered and bring it to the pilular consistence. This preparation, from its unchangeableness, is preferred to the ordinary subcarbonate, and is one of the most popular of the chalybeates. It contains nearly half its weight of carbonate of the protoxide of iron. From five to twenty grains of the pilular mass may be taken in divided doses through the day.

Mistura Ferri Composita (*Compound Mixture of Iron*), is a mixture of the carbonate of iron (prepared by the reaction of sulphate of iron twenty grains, and carbonate of potassa twenty-five grains), with myrrh sixty grains, spirit of lavender half a fluidounce, and rose-water seven fluidounces and a half, and sugar sixty grains to resist oxidation. It is a favorite chalybeate in chlorosis and amenorrhœa. Dose, f℥j to f℥ij, three times a day.

Pilulæ Ferri Compositæ (*Compound Pills of Iron*), are prepared with carbonate of soda and sulphate of iron each sixty grains, myrrh one hundred and twenty grains, and syrup, the mass to be divided into eighty pills. Dose, from two to six pills three times a day. Both these preparations should be made only as wanted for use.

Ferri Sulphas (*Sulphate of Iron*), known, in its impure state, as *green vitriol* or *copperas*, is prepared for medicinal use by dissolving iron wire in diluted sulphuric acid, with heat. It is a sulphate of the protoxide, (FeO,SO_3+7HO), and occurs in transparent, pale bluish-green crystals, of an acrid styptic taste, soluble in water, but insoluble in alcohol. By exposure to the air, they effloresce, absorb oxygen, and become yellowish-white, from the formation of sulphate of the sesquioxide. When heated to 212°, they give out six of their seven equivalents of water, and are converted into a grayish-white mass, known as the *dried* sulphate. Sulphate of iron is one of the most active of the ferruginous preparations, but its local effects are powerfully astringent, and in a concentrated form it acts as an irritant poison. It is preferred to other chalybeates, where there is much relaxation of the solids, with excessive discharges; but it is not so well adapted to a long-

continued use, on account of its local irritant action. Topically, it is employed in substance and solution, as a styptic and astringent. Dose, gr. j to gr. v, in pill; of the *dried sulphate* (*ferri sulphas exsiccata*), gr. ss to gr. iij.

Liquor Ferri Tersulphatis (*Solution of Tersulphate of Iron*). This preparation is made by dissolving 12 troyounces of the sulphate (of the protoxide) of iron in a mixture of 2 troyounces and 60 grains of sulphuric and a troyounce and 360 grains of nitric acid, with water enough to make a pint and a half of solution. The nitric acid furnishes oxygen to the protoxide of iron which converts it into a sesquioxide, and the sulphuric acid gives the additional acid required to saturate the sesquioxide. (It is $Fe_2O_3 3SO_3$). This solution is a clear, reddish-brown liquid, of a sour, very astringent, and somewhat acrid taste. Its chief use is in making the sesquioxide of iron, and it should be kept on hand, for the preparation of the hydrated sesquioxide of iron, as an antidote for arsenious acid. It may be used as a styptic, but for this purpose it is inferior to the next preparation.

Liquor Ferri Subsulphatis (*Solution of Subsulphate of Iron*). This solution, known as *Monsel's Solution*, is made in the same way as the last preparation, except that only half the amount of sulphuric acid is used; the sesquioxide of iron is therefore only partially saturated, and a subsalt results, ($2Fe_2O_3 5SO_3$). It has a syrupy consistence, a ruby-red color, is inodorous, and has a very astringent but not acrid taste. It is a less irritant salt than the tersulphate, and may be used internally, in hemorrhage from the stomach and bowels, in the dose of from five to fifteen grains. Externally, it is one of the most efficacious styptics we can employ, and has been injected into varicose veins with success for the cure of varicose ulcers. Diluted with water, it is a good local application to inflamed mucous surfaces.

Ferri Chloridum (*Chloride of Iron*). This salt, which is the sesquichloride (Fe_2Cl_3), is made by heating iron wire with muriatic acid, (by which the protochloride is formed), and

afterwards converting the protochloride into the sesquichloride by heating it with muriatic and nitric acids. It occurs in fragments of a crystalline structure, an orange-yellow color, inodorous, of a strong chalybeate, styptic taste, deliquescent, and soluble in water, alcohol, and ether. Internally, it is used chiefly in the form of the *tincture*. Externally, it is applied as a styptic, and in solution, of various strengths, as an astringent. One part, gradually added to six parts of collodion, forms a yellowish-red, limpid liquid, of valuable styptic properties.

Tinctura Ferri Chloridi (*Tincture of the Chloride of Iron*). This is prepared by dissolving iron wire (*three troyounces*) in muriatic acid (*eleven troyounces*), then in muriatic acid (*six troyounces and a half*) and nitric acid (*a troyounce and a half*), and afterwards adding distilled water enough to make the liquid measure a *pint*, and finally mixing with alcohol *three pints*. It is a tincture of the sesquichloride, though there is probably some reaction betwen the acid and alcohol, as the preparation has an ethereal odor. It is of a reddish-brown color, and has a sour, styptic taste. It is one of the most effective of the chalybeates, acting locally as an energetic astringent and styptic, and, in large doses, as an irritant. Its indications, both general and topical, are very analogous to those of the sulphate, with the addition of some specific action on the urino-genital apparatus, which renders it applicable to the treatment of affections of these organs. Dose, ♏x to ♏xxx, gradually increased to f℥j or f℥ij, and taken in some mild diluent.

Ferri Iodidum (*Iodide of Iron*). This salt is the *protiodide* of iron (FeI), and is made by the addition of iron filings to a mixture of iodine in distilled water. By evaporation, with as little contact of air as possible, green tabular crystals are obtained, of a styptic taste, volatile, deliquescent, and very soluble in both water and alcohol. But, by exposure to the air, the protiodide of iron undergoes decomposition: a portion of the iron parting with its iodine, and becoming oxidized. Hence, the salt is hardly fit for medicinal use, unless protected from decomposition, as in the officinal

Syrupus Ferri Iodidi (*Syrup of Iodide of Iron*), which is prepared with the addition of sugar. This is an excellent alterative tonic, combining the effects of iodine and of iron, and is particularly applicable to the treatment of scrofula, visceral engorgements, phthisis, &c. Dose, twenty to forty drops, three times a day.

Pilulæ Ferri Iodidi (*Pills of Iodide of Iron*), are made with iodide of iron, reduced iron, sugar, gum arabic, marsh-mallow, and balsam of Tolu. They keep very well. Each pill contains about one grain of iodide of iron, and one-fifth of a grain of reduced iron.

Ferri et Potassæ Tartras (*Tartrate of Iron and Potassa*) ($Fe_2O_3,KO,C_8H_4O_{10}+HO$), is prepared by the addition of hydrated oxide of iron to a mixture of bitartrate of potassa in distilled water. It occurs in transparent scales of a ruby-red color, which are wholly soluble in water. The tartaric acid and potash, in combination in this preparation, render it less constipating than the other chalybeates; and, from its agreeable taste, it is adapted to the diseases of childhood. Dose, gr. x to ʒss.

Ferri Phosphas (*Phosphate of Iron*), is obtained by the double reaction of solutions of sulphate of iron and phosphate of soda, and is a phosphate of the protoxide ($3FeO,PO_5$). It is a white powder, insoluble in water, but soluble in diluted acids; by exposure to the air it absorbs oxygen, with the production of sesquioxide of iron, and acquires a blue color. Dose, gr. v. to gr. x.

Ferri Pyrophosphas (*Pyrophosphate of Iron*), is a mixture of pyrophosphate of the sesquioxide of iron ($2Fe_2O_3,3PO_5$), and of citrate of ammonia. It occurs in apple-green scales, of an acid taste, and is very soluble in water. A good chalybeate. Dose, grs. ij–v. Given also as a *syrup*.

Ferri Citras (*Citrate of Iron*), is prepared by the addition of hydrated oxide of iron to a solution of citric acid. It is a citrate of the sesquioxide ($Fe_2O_3,C_{12}H_5O_{11}$), and occurs in thin, transparent pieces, of a garnet-red color, with a mild, acid, chalybeate taste, slowly soluble in cold water, but readily soluble in boiling water. Dose, gr. v to gr. x. It is officinal

also in the form of *solution of citrate of iron* (*liquor ferri citratis*), a deep reddish-brown liquid, given in doses of ten to twenty drops; and it is by evaporating this solution that the solid citrate is obtained. The addition of a few drops of liquor ammoniæ converts this salt into an *ammonio-citrate*, which is more soluble, and possesses antacid properties. Dose, the same.

Liquor Ferri Nitratis (*Solution of Nitrate of Iron*), is prepared by the gradual addition of diluted nitric acid to an excess of iron. It is a ternitrate of the sesquioxide of iron ($Fe_2O_3,3NO_5$), and is a pale, amber-colored liquid, with a strong, astringent, acid taste. It is tonic and astringent, agreeing very well with the stomach, and is employed in the treatment of chronic diarrhœa, hæmatemesis, hemorrhage from the bowels, and uterine hemorrhage, particularly when anæmic symptoms are present. Dose, gtt. x to gtt. xx, two or three times a day, in dilution.

Ferrum Ammoniatum (*Ammoniated Iron*), is prepared by evaporating a solution of sesquichloride of iron and muriate of ammonia. It is a mechanical mixture of these salts, and is of an orange-red color, wholly soluble in water and diluted alcohol. It contains a small and variable quantity of iron; but is considered a valuable deobstruent in glandular swellings, and in large doses is aperient. It is not now officinal. Dose, gr. iv to gr. xij, or more.

Ferri Ferrocyanidum (*Ferrocyanide of Iron*) (Fe_4Cfy_3), or *Pure Prussian Blue*, is obtained by the action of ferrocyanide of potassium on tersulphate of sesquioxide of iron. It is of a rich dark-blue color, without smell or taste, and is insoluble in water and alcohol. Its effects on the economy in health are not very striking; but it has been used both as an antiperiodic tonic and in the treatment of neuralgia, chorea, &c. Dose, gr. v. three or four times a day.

Ferri Lactas (*Lactate of Iron*), is made by mixing diluted lactic acid with iron filings. It is a lactate of the protoxide ($FeO,C_6H_5O_5+3HO$), and occurs in greenish-white crystalline crusts or grains, of a mild, sweetish, ferruginous taste, spa-

ringly soluble in water, and insoluble in alcohol. Used in chlorosis, and has a marked effect in increasing the appetite. Dose, gr. x–xx, in *pill*, *lozenge*, or *syrup*.

Ferri et Quiniæ Citras (*Citrate of Iron and Quinia*). This salt is prepared by precipitating quinia from the sulphate by ammonia, and afterwards dissolving it in a hot solution of citrate of iron. As found in the shops, it is probably a mixture of citrate of sesquioxide of iron, with a variable proportion of citrate of iron and quinia. It occurs in thin, transparent scales, of a reddish or yellowish-brown color, with a tint of green, not very soluble in water. It combines the virtues of its two bases; five or six grains contain about a grain of quinia.

Ferri et Ammoniæ Sulphas (*Sulphate of Iron and Ammonia*), ($Fe_2O_3,3SO_3+NH_4O,SO_3+24HO$). This salt, called also *ammonio-ferric alum*, is made by adding sulphate of ammonia to the hot solution of tersulphate of iron. It occurs in octohedral crystals, of a pale violet color and sour astringent taste, efflorescent, and soluble in water. Used in diarrhœa and chronic dysentery. Dose, gr. v–xv, two or three times a day.

Ferri et Ammoniæ Tartras (*Tartrate of Iron and Ammonia*) ($Fe_2O_3,NH_4O+C_8H_4O_{10}$), occurs in transparent, garnet-red scales, of a sweetish taste, soluble in water, insoluble in alcohol and ether. A mild chalybeate. Dose, gr. x–xxx.

Various other combinations of iron have been from time to time introduced into the practice of medicine; but they are needlessly multiplied. The *arseniate*, *acetate*, *bromide*, *oxalate*, *tannate*, and *valerianate*, are recommended by different therapeutists.

CUPRI PRÆPARATA—PREPARATIONS OF COPPER.

Metallic copper is inert. The salts of copper act locally as caustics, irritants, and astringents. When exhibited in small doses, they exert a corroborant influence over the cerebro-spinal system, and are employed to fulfil the indications to

which *tonics* are applicable, as in the cure of ague, neuralgia, epilepsy, &c. In larger doses, they act as *emetics;* and, in excessive doses, they produce gastro-intestinal inflammation, and disorder of the nervous system. They are employed therapeutically, both as external and internal remedies; externally, as stimulants, astringents, styptics, and caustics; internally, as tonics, astringents, and emetics. In cases of poisoning from the cupreous compounds, the best antidote is *albumen*, as white of eggs, milk, wheaten flour. The *ferrocyanide of potassium* is also very efficacious, forming with the cupreous compound an insoluble ferrocyanide of copper.

Cupri Sulphas (*Sulphate of Copper*). This salt, known as *blue vitriol*, is obtained by roasting the native sulphuret, or by combining the oxide of copper and sulphuric acid. It is a sulphate of the protoxide (CuO,SO_3+5HO). It occurs in fine, prismatic, blue crystals, which, by exposure to the air, effloresce slightly, and become covered with a greenish-white powder. It has a styptic, metallic taste, is entirely soluble in water, but insoluble in alcohol. It is employed as a *tonic* and *nervine*. It is an excellent remedy in obstinate intermittent fever, in doses of gr. $\frac{1}{4}$ to gr. j, or more, in pill, repeated so as not to occasion vomiting. As an *astringent*, it may be given in the same doses, and will be found extremely valuable in the treatment of chronic diarrhœa and dysentery, and chronic catarrh with profuse secretion. As an *emetic*, the dose is gr. iij to gr. v. Externally, it is used as an escharotic to fungous granulations, and in solution to arrest hemorrhages, mucous discharges, &c.

Cuprum Ammoniatum (*Ammoniated Copper*) is made by rubbing together sulphate of copper and carbonate of ammonia. It is probably a double compound of cuprate of ammonia and sulphate of ammonia (NH_3,SO_3+NH_3,CuO), and has a deep azure-blue color, a styptic, metallic taste, and an ammoniacal odor. Its action is very similar to that of sulphate of copper; but it is used principally as an antispasmodic tonic in nervous disorders,—epilepsy, chorea, hysteria, spasmodic asthma, &c. Dose, gr. $\frac{1}{2}$, gradually increased.

Cupri Subacetas (*Subacetate of Copper*), or *Verdigris*, ($2CuO,C_4H_3O_3$), occurs in pale bluish-green or blue masses or powder. The dose is gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$; but it is a powerful poison in an overdose, and hence is rarely given as a tonic. The powder is used as an escharotic, and an *ointment* is used.

ZINCI PRÆPARATA—PREPARATIONS OF ZINC.

Zinc in its metallic state is inert. Its compounds are very analogous in their effects on the system to those of copper, but are less energetic. They are employed topically as caustics, astringents, and desiccants; and internally as tonics and antispasmodics, and in large doses, as emetics. In cases of poisoning (which are, however, very uncommon), demulcents and opiates are to be administered.

Zinci Sulphas (*Sulphate of Zinc*), or *White Vitriol*, is prepared by dissolving zinc in diluted sulphuric acid. It occurs in small, colorless, transparent, prismatic crystals, resembling those of sulphate of magnesia (ZnO,SO_3+7HO). They have a metallic, astringent taste, are soluble in water, and insoluble in alcohol. Dose, as a *tonic*, *antispasmodic*, and *astringent*, gr. j to gr. v; as an *emetic*, it is the promptest and safest that can be given in cases of narcotic poisoning, in the dose of gr. x to gr. xx. Externally it is much used as a caustic, and in solution as an application to inflamed mucous membranes, in the strength of gr. j or ij to f℥ss of water.

Zinci Oxidum (*Oxide of Zinc*) is made by exposing carbonate of zinc to heat. It is a white powder (ZnO), insoluble in water, but soluble in diluted sulphuric and chlorohydric acids. It has been given as an antispasmodic tonic, in doses of gr. ij to iij, gradually increased to gr. vii or x, and is highly esteemed in the treatment of epilepsy; but it is chiefly used externally as a dusting powder, or in the form of *ointment* (eighty grains to lard a troyounce).

Zinci Acetas (*Acetate of Zinc*) is made by adding zinc to a

solution of acetate of lead, and occurs in white micaceous crystals ($ZnO,C_4H_3O_3+7HO$), very soluble in water. It may be given internally as a tonic antispasmodic, in the dose of gr. j or ij, gradually increased; but it is chiefly used as a topical astringent in ophthalmia, gonorrhœa, leucorrhœa, &c., in the proportion of gr. ij to gr. vj, or more, to an ounce of water.

Zinci Carbonas Præcipitata (*Precipitated Carbonate of Zinc*), is obtained by the double reaction of solutions of sulphate of zinc and carbonate of soda. It is a soft, white powder ($8ZnO,3CO_2+6HO$), similar in its action to the oxide, but is chiefly used as a dusting powder, and to make a mild astringent and desiccant *cerate* (a troyounce to ointment of lard five troyounces).

Calamina Præparata (*Prepared Calamine*), obtained by heat from *calamine*, the native impure carbonate of zinc, is a pinkish powder used as a desiccant, and in the form of a *cerate*, called Turner's cerate. *Calamine* is so frequently adulterated that it is now dismissed from the Pharmacopœia, though still much used.

Zinci Chloridum (*Chloride of Zinc*) (ZnCl), is made by dissolving zinc in muriatic acid,—nitric acid and chalk being added to remove any iron which may have been present with the zinc. It is a whitish-gray, semitransparent, deliquescent mass, having the softness of wax, and is soluble in water, alcohol, and ether. It has been employed internally in doses of gr. j or ij, as an antispasmodic tonic in chorea, epilepsy, and neuralgia. Its local action is that of a powerful caustic, and it is one of the best escharotics that can be exhibited, to produce healthy granulations in malignant or indolent ulcers, especially in lupus. It may be used as a lotion in the strength of gr. ij to f℥j of water, or dissolved in a little alcohol, or in the form of paste, made with one part of the salt to two or four of flour. A solution of the chloride of zinc is employed as an antiseptic, and is also injected into the bloodvessels of anatomical subjects to preserve them for dissection.

Zinci Iodidum (*Iodide of Zinc*) (ZnI), is made by digesting

an excess of zinc with iodine diffused in water. It occurs in the form of a white deliquescent mass, or of fine needles, of a metallic styptic taste, very soluble in water. It has been used internally, as a tonic, antispasmodic, and astringent, in doses of gr. i–ij, best exhibited in the form of syrup. Externally, it is a most valuable local stimulant and escharotic, equal if not superior in effect to the chloride.

Zinci Valerianas (*Valerianate of Zinc*) ($ZnO,C_{10}H_9O_2$), is prepared by the double reaction of valerianate of soda and sulphate of zinc. It occurs in white, pearly scales, having a faint odor of valerianic acid, and a metallic styptic taste. Very slightly soluble in water, more so in alcohol. Used in epilepsy and nervous affections, in the dose of one or two grains, repeated several times a day.

ARGENTI PRÆPARATA—PREPARATIONS OF SILVER.

In the metallic state, silver is wholly inert. The only preparation which is extensively employed is—

Argenti Nitras (*Nitrate of Silver*). This salt (AgO,NO_5) is obtained by dissolving silver in diluted nitric acid. It occurs in transparent, colorless, prismatic crystals, which have a strongly metallic and bitter taste, and are wholly soluble in distilled water, and become blackened by the action of light and organic matters. Its solution yields with chloride of sodium a white precipitate, entirely soluble in ammonia.

Physiological Effects.—The topical action of nitrate of silver is that of a caustic or corrosive; and this effect is produced by its combining with the albumen and fibrin of the tissues. When applied to mucous membranes, it forms a compound with the animal matter of the mucus, which protects the tissues from the action of the caustic. Hence, large doses may be taken with considerable impunity by the stomach. But, in excessive quantity, it may occasion gastro-enteric irritation, with disturbance of the nervous system; and, in these cases, the *antidote* is *common salt* (chloride of sodium), which

produces, when in contact with the nitrate, nitrate of soda and chloride of silver. In medicinal doses nitrate of silver has a specific corroborant and antispasmodic action on the nervous system; and, after prolonged use, produces a peculiar indelible *blueness* or *slate-color* of the skin.

Medicinal Uses.—*Internally*, nitrate of silver has been chiefly employed as an antispasmodic tonic in the treatment of epilepsy, and it is among the most reliable remedies that can be administered in this intractable affection; but its effect in discoloring the skin is an objection to its protracted use. It is also used in chorea and gastrodynia, and as an astringent in dysentery. But it is as an *external agent* that it is chiefly resorted to. It is the most efficacious application that can be made to inflamed mucous membranes, and either in the solid form or in solution, it is employed in every variety of inflammation of this tissue. It is also extensively used to produce healthy granulations in wounds and ulcers, to arrest the progress of erysipelatous inflammation and variolous pustules, in porrigo and other skin diseases, in strictures, and to destroy the virus of chancres and of poisoned wounds.

Administration.—The dose of nitrate of silver internally is gr. $\frac{1}{6}$, gradually increased to gr. iij or iv, three times a day, in pill made with some mild vegetable powder. For external use, solutions are made of various strengths, from gr. ij to ʒss, in an ounce of distilled water. An ointment is also employed.

Argenti Nitras Fusa (*Fused Nitrate of Silver, Lunar Caustic*). For external use, in the solid form, nitrate of silver is melted and poured into small moulds.

Argenti Oxidum (*Oxide of Silver*) (AgO), is obtained by adding solution of potassa to a solution of nitrate of silver. It is a tasteless, olive-brown powder, very slightly soluble in water. Its uses are analogous to those of the nitrate, and it is employed in epilepsy, gastrodynia, chronic diarrhœa, uterine disease, &c. It is considered to be free from liability to discolor the skin. Dose, gr. ss to gr. ij, twice or thrice daily, in powder or pill.

BISMUTHI SUBNITRAS—SUBNITRATE OF BISMUTH.

This salt is prepared by first forming the ternitrate of bismuth by dissolving bismuth in diluted nitric acid; as metallic bismuth generally contains arsenic, the nitrate thus formed is converted into the carbonate, by the addition of solution of carbonate of soda, whereby most of the arsenic is removed as soluble arseniate of soda; the carbonate of bismuth is next dissolved in nitric acid, and the nitrate of bismuth is again formed; a little water is added to the mixed solution of nitrate and arseniate of bismuth, by which the subarseniate is deposited and separated; the addition of a large amount of water causes a deposition of subnitrate of bismuth; the supernitrate remaining in solution is lastly decomposed by ammonia, which takes most of the nitric acid, and precipitates the bismuth combined with the remainder in the form of subnitrate. Subnitrate of bismuth ($BiO_3.NO_5$) is a white, inodorous, tasteless powder, nearly insoluble in water. Its medicinal properties are tonic, antispasmodic, and astringent, and it has been employed in intermittent fever; but it is now chiefly used to allay sickness and vomiting in chronic nervous affections of the stomach, and also as an astringent in subacute and chronic diarrhœa. Dose, gr. v to ℈j, or even ℥ss, in powder or pill. Externally, it is a good remedy in skin diseases in the form of ointment. The *subcarbonate of bismuth—bismuthi subcarbonas* (BiO_3CO_2)—is recommended as a substitute for the subnitrate. It is thought to be more readily tolerated by the stomach, and is more soluble in the gastric juice, but it is less astringent.

CADMII SULPHAS—SULPHATE OF CADMIUM.

This salt is obtained by the reaction of sulphuric acid upon carbonate of cadmium. It occurs in transparent, colorless, prismatic crystals (CdO,SO_3), of an astringent, austere taste, and very soluble in water. In its effects on the system, it closely resembles sulphate of zinc, but it has been chiefly

used in this country, as a collyrium (gr. j–ij to water f℥j), and has been found very efficacious in specks and opacities of the cornea.

CERII OXALAS—OXALATE OF CERIUM.

This salt ($2CeO,C_4O_6+6HO$), is usually made by adding a solution of oxalate of ammonia to any soluble salt of cerium, and is also obtained from the mineral *cerite*. It occurs as a snow-white, granular powder, inodorous and tasteless, insoluble in water, alcohol, and ether, but dissolved by sulphuric acid. It is believed to resemble the salts of silver, bismuth, and zinc in its effects, and has lately been deservedly extolled in obstinate forms of vomiting, especially the vomiting of pregnancy. In chorea, and other neuroses, it is also highly recommended. Dose, a grain three times a day, or oftener, in pill or suspended in water. The *nitrate of cerium* has also been employed, and is more soluble. Dose, somewhat less.

ACIDA MINERALIA—MINERAL ACIDS.

The diluted mineral acids are usually classed with tonics; but, although they exert a very considerable corroborant influence on the system, their action is in many respects peculiar and distinctive. In the concentrated form, they are corrosive. When properly diluted with water and swallowed in medicinal doses, they allay thirst, increase the appetite, and stimulate digestion. After absorption into the blood, they often produce a restorative effect in morbid conditions of the circulating fluid, and in their passage out by the secretions, act as astringents. They are employed—as tonics, usually in combination with the vegetable bitters, in dyspepsia, especially when it is dependent on a deficiency of the gastric fluid; as antalkalines, to correct the morbid alkalinity of the blood in typhoid and other essential fevers, and in purpura and analogous blood diseases; as astringents and styptics in he-

morrhage from the stomach and bowels, and in colliquative discharges; to allay febrile heat and cutaneous irritation; in phosphatic lithiasis; and locally, as escharotics; and, in very dilute solution, they are injected into the bladder as lithontriptics. In cases of poisoning from the mineral acids, the alkaline earths and fixed oils are the proper antidotes.

Acidum Sulphuricum (*Sulphuric Acid*), formerly called *Oil of Vitriol*, is obtained by burning sulphur, mixed with nitre, over a stratum of water contained in a chamber lined with sheet-lead. It is a dense, colorless, inodorous, corrosive liquid, which unites with water in all proportions, with the evolution of heat. It consists of one equivalent of sulphur and three equivalents of oxygen (SO_3), and, when of the sp. gr. 1.845, contains one equivalent of water. It should have, as directed by the Pharmacopœia, the sp. gr. 1.843, when it contains 79 per cent. of anhydrous acid. In this concentrated form, it is not employed internally, but is sometimes used externally as a caustic. When swallowed, it acts as a violent corrosive poison, usually staining the lips, mouth, and fauces with white or black sloughs. The proper *antidote* is magnesia, or solution of soap, and mucilaginous drinks should be afterwards freely administered.

Acidum Sulphuricum Dilutum (*Diluted Sulphuric Acid*), contains two troyounces of sulphuric acid in a pint of diluted acid. It is given as a tonic, refrigerant, and astringent, in the dose of from ten to thirty drops, three times a day, in water, and should be sucked through a tube to prevent injury to the teeth. This acid is a particularly valuable remedy in typhus and typhoid fevers, colliquative perspirations, and choleraic diarrhœa; and it is the best corrective for phosphatic lithiasis. It is used externally as a gargle, and wash to ulcers.

Acidum Sulphuricum Aromaticum (*Aromatic Sulphuric Acid*), or *Elixir of Vitriol*, is made by digesting six troyounces of sulphuric acid in a pint of alcohol, then percolating a troyounce of ginger and a troyounce and a half of cinnamon with alcohol till a pint of tincture is obtained, and mixing the tincture with the diluted acid. It is a reddish-brown liquid, with an aromatic odor and a pleasant acid taste; and is an agree-

able substitute for the diluted sulphuric acid, administered in the same doses.

Acidum Sulphurosum (*Sulphurous Acid*), is made by heating sulphuric acid with charcoal and distilled water. The sulphuric acid (SO_3) is deprived of an equivalent of oxygen by the charcoal, and becomes sulphurous acid (SO_2). It is a colorless liquid, having the smell of burning sulphur, and a sulphurous somewhat astringent taste. It has been only of late years employed in medicine, and is believed to have a special influence in destroying parasitic life. Internally, it is very efficacious in sarcina ventriculi, or yeast vomiting; dose, f℥j, largely diluted with water. Externally, it is used in skin diseases (particularly those of a parasitic nature, either animalcular or cryptogamous)—diluted with two or three measures of water or glycerin. The *sulphite of soda—sodæ sulphis* (NaO, SO_2+8HO)—is used as a substitute for sulphurous acid, which is developed from the salt by any of the organic acids; dose, ℥j, three times a day; a solution (℥i–f℥i of water) is a good local application in erysipelas. The *hyposulphite of soda* (NaO,S_2O_2+7HO), is used for the same purposes; dose, gr. x–xx, three times a day, and for *external use*, ℥j, dissolved in water f℥j. Both the sulphite and hyposulphite of soda have been found very efficacious in intermittent and remittent fevers. The sulphite is perhaps the more efficacious salt. The *sulphite of magnesia* is also employed in zymotic diseases, and is less unpalatable than the soda salt, and besides contains a larger proportional quantity of acid. Both the sulphites of soda and magnesia are employed in the treatment of purulent infection. *Sulphites* of *lime*, *potash*, and *ammonia* have been also recommended.

Acidum Nitricum (*Nitric Acid*) (NO_5), is obtained by the action of sulphuric acid upon nitrate of potassa. When pure, it is colorless; but, as found in the shops, it is usually of a straw color, owing to the presence of hyponitric acid. It should have a sp. gr. 1.42 (when it contains 60 per cent. of anhydrous acid), and is a corrosive, sour liquid, employed, in the concentrated form, as an escharotic to destroy warts and stimulate indolent sinuses, and diluted, as an astringent wash or

gargle. Cases of poisoning from this acid are to be treated with magnesia or soap, and mucilaginous drinks. In poisoning from nitric acid, the fauces and mouth are covered with yellow eschars. Internally, it is used in the form of

Acidum Nitricum Dilutum (*Diluted Nitric Acid*), which contains three troyounces of acid in a pint of diluted acid. This is given as a substitute for sulphuric acid, but is more apt to disagree with the stomach; it is also employed as an alterative in syphilis, and has been found useful in whooping-cough. Combined with laudanum and camphor-water, it is much used in the treatment of dysentery, under the name of *Hope's Camphor Mixture* (camphor water f℥viij, nitric acid f℥i, laudanum 25 drops; dose f℥ss, repeated). Dose, for internal use, 20 to 40 drops, three times a day, reduced with water.

Acidum Muriaticum (*Muriatic Acid*), is an aqueous solution of chlorohydric acid gas (HCl), and is obtained by the action of sulphuric acid on solution of chloride of sodium or common salt. It is, when pure, a transparent, colorless liquid, but has often a yellow color, owing to the presence of iron or other contaminations. It has a corrosive taste, and a suffocating odor, and is an active poison, though less irritating than sulphuric and nitric acids. Magnesia or soap is the proper antidote. It is used, externally, as a caustic, and as an application in diphtheria, ulcerative and gangrenous stomatitis, &c.; internally, in the form of

Acidum Muriaticum Dilutum (*Diluted Muriatic Acid*), which contains four troyounces of acid in a pint of diluted acid. This is employed in typhoid and typhus fevers, malignant scarlatina, &c.; also to counteract phosphatic deposits in the urine, to prevent the generation of worms, in syphilis, in dysentery, and in some forms of dyspepsia. Dose, twenty to sixty drops, which may be given in infusion of roses.

Acidum Nitro-Muriaticum (*Nitro-Muriatic Acid*). This acid is made by mixing three parts of nitric acid with five parts of muriatic acid, and consists of two compounds of chlorine and nitric oxide (NO_2Cl_2 and NO_2Cl), mixed with free chlorine. It has a golden-yellow color, and emits the smell of chlorine.

Internally, it is employed in the same cases as nitric acid, and is thought to be particularly efficacious in oxaluria, and in diseases of the liver and syphilis. It should not be given with mercurials. *Externally*, it is used as a bath, either local or general, in oxaluria, syphilis, and chronic hepatitis, for which purpose one or two ounces of acid may be added to a gallon of water. Dose, from two to five drops, properly diluted and carefully increased. *Diluted Nitro-Muriatic Acid* contains five troyounces of acid in a pint of diluted acid; dose, ten to twenty drops.

ORDER V.—ASTRINGENTS.

These are medicines which produce contraction and corrugation of the tissues. Their constitutional effects are somewhat analogous to those of tonics; as, like them, they increase the tone and vigor of the body, and exercise a control over various disorders of the nervous system. But they are chiefly employed to cure relaxation of the fibres and tissues, to subdue inflammation of superficial parts, and to arrest hemorrhage and excessive discharges from mucous membranes or other secreting surfaces. In checking morbid discharges from the bowels, astringents, while they diminish the secretions from the intestinal canal, do not, like opium, restrain the peristaltic movements; hence the necessity of combining them with opiates. They are divided into *Vegetable* and *Mineral* astringents. Most of the former owe their astringency to the presence of a principle termed TANNIC ACID, and differ from tonics in the absence of bitterness. The mineral preparations usually classed among astringents, are those of alum and lead, and are distinguished from the mineral astringent-tonics, by their more decided astringency and a sedative action on the vascular system.

VEGETABLE ASTRINGENTS.

ACIDUM TANNICUM—TANNIC ACID.

This acid, which is the active principle of the vegetable astringents, is usually extracted from powdered galls by the action of ether. It is of a yellowish-white color, and a strongly astringent taste, is very soluble in water, and soluble, though less so, in alcohol and ether. It produces a white flocculent precipitate with solution of gelatine, a bluish-black precipitate with the salts of the sesquioxide of iron, and white precipitates with solutions of the vegetable alkalies; and these substances are to be, therefore, considered *incompatible* with all the vegetable astringents. There is a variety of tannic acid, obtained from catechu and some other substances, which strikes a *greenish-black* precipitate with the salts of iron, and is not convertible into gallic acid. Tannic acid is $C_{54}H_{19}O_{31}+3HO$.

Effects and Uses.—Tannic acid is a powerful astringent, and is applicable to all the cases in which astringents are useful. It is greatly resorted to, internally, in the treatment of diarrhœa, dysentery, cholera, hemorrhage, colliquative sweats, &c.; also as an enema in diarrhœa, dysentery, prolapsus ani, and fissure of the rectum; and as a topical application, in inflammations and morbid discharges from mucous membranes, ulcers, &c. It is, perhaps, the best form in which the vegetable astringents can be employed, owing to the certainty and minuteness of the dose in which it can be given. Dose, gr. j to gr. iij, or iv, in pill, occasionally repeated.

ACIDUM GALLICUM—GALLIC ACID.

This principle is found in many of the vegetable astringents, but less uniformly than tannic acid, and is probably the result of changes which the latter has undergone. It is prepared by exposing a solution of galls to the air, when the tannic acid gradually absorbs oxygen and is converted into gallic acid.

It occurs in small, silky, nearly colorless crystals, having a slight acid and astringent taste, and is soluble in boiling water, and slightly so in cold water. It is $C_7\dot{H}_3O_5$.

Effects and Uses.—Gallic acid is a valuable astringent, which has of late been extensively employed in hemorrhagic disorders, as uterine hemorrhage, hemoptysis, hæmaturia, bloody diarrhœa, &c. Both tannic and gallic acids have been found useful in albuminuria. Gallic acid has but feeble local astringent powers, and is probably converted into tannic acid in the blood; though in hemorrhages, it is said to be more efficacious than the latter acid. It may be given in doses of gr. ij to gr. v, in pill, every two or three hours.

GALLA—NUTGALL.

Galls are morbid EXCRESCENCES found upon Quercus infectoria, or the Gall Oak (*Nat. Ord.* Corylaceæ), a small tree or shrub of Asia Minor. The Gall-nuts are produced by the puncture of the buds by a fly (*Cynips quercûsfolii*), to form a nidus for its eggs. This occasions an irritation and flow of juices to the part, resulting in the formation of a tumor round the larva, which, on attaining maturity, perforates the gall and escapes. Galls are produced chiefly in Syria and Asia Minor, and are imported from the Levant. They are brought also from Calcutta, being collected to some extent in India. Galls are spherical, about the size of a hickory-nut, but of varying dimensions, with small tubercles on their surface. The best are *bluish* or *black* externally, and grayish within, without odor, and of a very astringent, bitter taste. They yield their properties to both water and alcohol, but best to the former, and contain both tannic and gallic acids. *White* galls are collected after they have been perforated by the insect, and are inferior in astringency.

Effects and Uses.—Galls are powerfully astringent, but are not much used internally. In the form of infusion or decoction, they are employed as enemata in diarrhœa and dysentery,

and also as gargles. Dose of the *powder*, gr. x to gr. xx. The *tincture* (four troyounces to diluted alcohol Oij) may be given in the dose of f℥j to f℥iij, but it is chiefly used a chemical test. The *ointment* (one part to seven parts of lard) is a favorite application in hemorrhoids.

CATECHU.

Catechu, formerly called Terra Japonica, is an EXTRACT of the wood of Acacia Catechu, a small prickly tree of India (*Nat. Ord.* Fabaceæ). Twelve or fifteen varieties of the drug are described by pharmacologists; but it is usually met with in the shops, in masses of various shapes and sizes, of a rusty-brown color externally, and varying internally from a reddish or yellowish-brown to a dark-brown color. The best is of a dark color, and is easily broken into small angular fragments, with a smooth glossy surface, bearing some resemblance to kino. It is without smell, and has an astringent, bitter taste. It contains about 50 per cent. of tannic acid (of the variety which strikes a *greenish-black* precipitate with the salts of iron), and about 30 per cent. of a peculiar extractive, called *catechuic acid*, to both of which it owes its peculiar properties.

Effects and Uses.—This is one of the most powerful and valuable of the vegetable astringents, possessing also mild tonic properties. It is much employed in diarrhœa, dysentery, hemorrhages, and in all cases of immoderate discharge, unattended with inflammatory action. It is a good deal used in relaxed conditions of the mouth and throat, also in aphthous ulcerations of the mouth, and spongy affections of the gums. Topically, it is employed as a styptic, and in solution as an injection in gonorrhœa and gleet, &c. Dose of the powder, gr. x to ℥ss, in bolus or emulsion.

INFUSUM CATECHU COMPOSITUM (*Compound Infusion of Catechu*), is made by adding boiling water (Oj) to powdered catechu (half a troyounce), and cinnamon (℥j)—dose, f℥j to

f℥ij, three or four times a day. Of the *tincture* (three troyounces to diluted alcohol Oij, with cinnamon two troyounces), the dose is f℥j to f℥iij.

KINO.

The term *Kino* is applied to the products of several trees. Five varieties are known. 1. East India kino, which is the most common, and is the INSPISSATED JUICE of Pterocarpus marsupium (*Nat. Ord.* Fabaceæ), a lofty tree of Malabar. 2. African kino, the original variety introduced into Europe, but not now met with; obtained from Pterocarpus erinaceus (*Nat. Ord.* Fabaceæ). 3. Jamaica kino, the *extract* of the wood and bark of Coccoloba uvifera, or Seaside Grape (*Nat. Ord.* Polygonaceæ), a small tree of South America and the West Indies. 4. South American or Caracas kino, which is probably derived from Coccoloba uvifera. 5. Botany Bay kino, the *concrete juice* of Eucalyptus resinifera (*Nat. Ord.* Myrtaceæ), a large tree of Australia.

East India kino is met with in small, angular, shining fragments, of a dark-brown or reddish-brown color, brittle, without smell, but with a very astringent taste. It contains tannic acid (of the second variety), kinoic acid (which is the red coloring matter), pectin, ulmic acid, and inorganic salts.

South American kino comes in large masses, externally very dark, and internally of a deep reddish-brown color.

Jamaica kino is like the last, but contained in large gourds.

Effects and Uses.—Kino is a powerful astringent, and is much used in diarrhœa, chronic dysentery, leucorrhœa, gonorrhœa, hemorrhages, &c. Externally, it is employed as a styptic, and as a stimulant to indolent ulcers. Dose, of the *powder* gr. x to ℥ss; of the *tincture* (℥vj to diluted alcohol, consisting of two measures of alcohol and one measure of water, f℥viij), f℥j or f℥ij may be given, and it is frequently added to chalk mixtures in diarrhœa. It spoils by keeping.

KRAMERIA—RHATANY.

Rhatany is the ROOT of Krameria triandra (*Nat. Ord.* Polygaleæ), a shrub of Peru. It occurs in woody, cylindrical pieces, of the thickness of a goose-quill to twice that size—many radicles being often united to a common head. They have a dark, reddish-brown bark, and a tough central ligneous portion, of a lighter red color. They are without smell, but have a very astringent, slightly bitter, and sweetish taste, which is much stronger in the cortical than the ligneous portion; and, hence the smallest pieces should be preferred, as they contain the most bark. Rhatany yields a large proportion of tannic acid (of the second variety), and a peculiar acid, termed *krameric*, both of which probably contribute to its astringency. It imparts its properties to both cold and boiling water, but more fully to alcohol.

Effects and Uses.—Rhatany is powerfully astringent, with some tonic properties. It is much used in the treatment of diarrhœa, dysentery, hemorrhages, &c., and as an enema in fissure of the anus, hemorrhoids, leucorrhœa, &c. The powdered extract is an ingredient in many tooth-powders, and the tincture is also used as an astringent mouth-wash. Dose of the *powder* gr. xx to gr. xxx. But it is more employed in *infusion* (a troyounce to boiling water Oj), dose, f℥j or f℥ij; watery *extract*, dose gr. x to gr. xx; *tincture* (six troyounces to diluted alcohol Oij), dose, f℥j to f℥ij; and *syrup* (twelve troyounces percolated with water till four pints of filtered liquor are obtained, which is to be evaporated to seventeen fluidounces, and in this thirty troyounces of sugar are to be dissolved by gentle heat), dose f℥j to f℥ss.

HÆMATOXYLON—LOGWOOD.

Logwood, or Campeachy wood, is the WOOD of Hæmatoxylon Campechianum (*Nat. Ord.* Fabaceæ), a medium-sized tree of Campeachy and other maritime parts of tropical America, and now naturalized in the West Indies. The portion used in medicine, and also as a dye, is the heart-wood, from which the

bark and white sap-wood are removed, previously to exportation. It is imported in billets of different sizes, of a dark color externally, and a deep-red internally; in the shops it is kept in chips or raspings. It has a sweetish, astringent, and rather peculiar taste, and a feeble, not unpleasant smell. It contains tannic acid, a coloring principle called *hæmatin* or *hæmatoxylin*, volatile oil, resin, &c.

Effects and Uses.—It is a mild astringent, useful in chronic diarrhœa and dysentery, and particularly well adapted to the weakened condition of the bowels, which follows cholera infantum, and is also much employed in the diarrhœa of phthisis. It is given either in *decoction* (a troyounce to water Oj), in the dose of f℥j to f℥ij to adults, and f℥j to ℥ij to children; or watery *extract* in the dose of gr. x to ℥ss, in solution.

QUERCUS ALBA—WHITE-OAK BARK. QUERCUS TINCTORIA—BLACK-OAK BARK.

The barks of several species of American oaks possess astringent properties, and are probably to be found in the shops, but the only officinal varieties are Quercus Alba, White Oak, and Quercus Tinctoria, Black Oak (*Nat. Ord.* Amentaceæ). The BARK is the portion used, but the leaves and acorns are also astringent. *White-Oak Bark* is distinguished by its whitish color. When prepared for use, it is deprived of its epidermis, and is of a light-brown color and fibrous texture, with an astringent and bitterish taste. Water and alcohol extract its virtues, which depend mainly on the presence of tannic and gallic acids, with a bitter principle, termed *quercin*. *Black-Oak Bark* is more furrowed, has a darker color, a more bitter taste, and stains the saliva yellow, when chewed; it is much employed as a dye, under the name of *quercitron*. It contains a larger proportion of tannic and gallic acids than the white-oak bark.

Effects and Uses.—A decoction of white-oak bark is a good remedy in diarrhœa and hemorrhages, and is employed as an enema in hemorrhoids, and prolapsus and fissure of the anus, as a gargle in relaxation of the uvula, and as an injection in leucorrhœa. It is used as a bath in the bowel complaints of

children; and a poultice of the ground bark is applied in gangrene. Black-oak bark is too irritating for internal exhibition: but for external use it is a stronger astringent than the white-oak bark. Of the *decoction* of white-oak bark (a troyounce to water Oj), f℥ij may be taken frequently.

GERANIUM—CRANESBILL.

Fig. 13.

One of the most powerful of the *indigenous* astringents is

Geranium maculatum, Crowfoot, or Cranesbill (*Nat. Ord.* Geraniaceæ), a perennial herbaceous plant growing in moist woody situations, with an erect stem, one or two feet high, three to five-lobed, incised, pale-green, mottled leaves, and large purple flowers, which appear in April and May. The part used is the RHIZOMA, which should be collected in the autumn. This, when dried, occurs in wrinkled, rough pieces, from a quarter to a half an inch in thickness, furnished with slender fibres, of a dark-brown color externally, and a pale flesh-color within. It has an astringent, but not bitter taste, little or no smell, and contains tannic and gallic acids, with some mucilage.

Effects and Uses.—This is an excellent simple astringent agreeing very well with the stomach, and might be advantageously substituted for more expensive foreign drugs. It may be used internally to fulfil the indications of kino, rhatany, &c., in bowel complaints and hemorrhages, and topically as an enema, gargle, injection, &c. It is also a valuable styptic. Dose, in *powder*, gr. x to xx; of the *decoction* (a troyounce to water Oj), f℥j to f℥ij may be given. A decoction in milk is given to children. An *extract* and *tincture* are also employed.

UVA URSI.

Arctostaphylos, Uva Ursi, or Bearberry (*Nat. Ord.* Ericaceæ), is a small, trailing, evergreen shrub, with coriaceous, obovate leaves (somewhat like box leaves, and red-whortleberry leaves), about half an inch in length, pale rose-colored flowers, appearing from June to September, and small red berries which ripen during the winter. It is found in the northern parts of Asia, Europe, and America. The LEAVES are the only part used. When dried, they have a faint hay-like odor, and a bitterish, astringent taste. They yield their virtues to water and alcohol, and contain tannic and gallic acids, a principle termed *ursin* (which is said to act as a diuretic in the dose of a grain), extractive, resin, gum, &c.

Effects and Uses.—Uva Ursi is astringent, tonic, and diu-

retic, and exercises a particular control over discharges from mucous surfaces. Hence, its employment in catarrh of the

Fig. 14.

bladder, chronic bronchitis, with profuse discharge, &c. It is also applicable to the ordinary uses of the vegetable astringents. Dose of the *powder*, ℈j to ℈ij, three times a day; but it is usually given in *decoction* (a troyounce to water Oj), of which f℥j to f℥ij may be taken three times a day. The *fluid extract*, which is a concentrated tincture, may be given in the dose of f℥ss–f℥j.

CHIMAPHILA—PIPSISSEWA.

Chimaphila umbellata, Pipsissewa, Wintergreen, or Ground-Holly (*Nat. Ord.* Pyrolaceæ), is a small indigenous, evergreen plant, common to the northern parts of Europe, Asia, and America, and found abundantly in woody situations in all parts of the United States. It has an erect stem, three to ten inches high, lanceolate, somewhat wedge-shaped, serrated, dark-green leaves, arranged in irregular whorls, and beautiful five-petaled flowers, of a white color tinged with red, and a very agreeable

perfume, which appear in June. The LEAVES are the officinal portion. In the fresh state, they have a fragrant smell when

Fig. 15.

bruised, which they loose after drying. Their taste is bitterish and astringent, but somewhat aromatic. They contain tannic acid, bitter extractive, resin, and probably some acrid volatile constituent—as the fresh leaves, when bruised and applied to the skin, will cause redness and even vesication.

Chimaphila maculata, or Spotted Pipsissewa, possesses analogous properties to those of C. umbellata, from which it differs principally in the character of its leaves. They are of a deep

olive-green color, veined with greenish-white; and the flowers are a pure white, and appear in July.

Effects and Uses.—Pipsissewa is astringent and tonic, and also diuretic. It is employed in the disorders of the urinary organs to which uva ursi is applicable, and also for its diuretic properties in dropsy, attended with debility of the digestive organs. Indeed, it is classed by some therapeutists among the diuretics. It is usually given in *decoction* (a troyounce to water Oi), of which Oj may be taken in the twenty-four hours; and a *fermented decoction*, made with molasses, ginger, and yeast, is often used. An *extract* is employed, in doses, of gr. x to gr. xv.

The following vegetable astringents deserve notice, though less frequently employed than the foregoing:

Granati Fructus Cortex (*Pomegranate Rind*). This is the RIND OF THE FRUIT of Punica granatum, the Pomegranate tree (*Nat. Ord.* Myrtaceæ), a small tree of Northern Africa, Syria, and Persia, now naturalized in the warmer portions of Europe, the West Indies, &c. The rind of the fruit is a powerful astringent, but is little used internally, from its liability to occasion nausea. Dose, in *powder*, gr. xx to ʒss; but it is best given in decoction (a troyounce to water Oj), dose, fʒj.

Rosa Gallica (*Red Rose*). Rosa Centifolia (*Pale Rose*). The PETALS of these two species of rose are officinal, but those of almost every other species of cultivated rose may be employed for the same purposes as the rosa centifolia, which is not astringent. The red rose is a mild astringent, and is chiefly used in conjunction with sulphuric acid, in the *infusum rosæ compositum—compound infusion of rose* (half a troyounce to boiling water Oijss, diluted sulphuric acid fʒiij, sugar a troyounce and a half); dose, fʒij to fʒiv. The *confection* is used as a basis for pills. *Mel Rosæ* (*Honey of Roses*), made with diluted alcohol and clarified honey, is used as an addition to gargles; the *syrup* is added to mixtures. The pale rose is slightly laxative. *Aqua Rosæ* (*Rose Water*), distilled from the pale rose, is much employed in collyria, &c.

Diospyros (*Persimmon*). The unripe fruit of Diospyros Virginiana (*Nat. Ord.* Ebenaceæ), an indigenous tree, is employed in diarrhœa, dysentery, and uterine hemorrhage, in infusion, syrup, and vinous and acetous tinctures. The bark is bitter and astringent, but is not officinal.

Tormentilla (*Tormentil*). The root of Potentilla tormentilla (*Nat. Ord.* Rosaceæ), a European plant, is used in Europe as an astringent, in the dose of ʒss to ʒj, but is seldom or never employed in this country.

Rubus (*Blackberry Root*). The roots of Rubus villosus, and Rubus Canadensis (*Nat. Ord.* Rosaceæ), the former an erect, prickly shrub, and the latter a creeping brier, are very efficient mild astringents, which have been used with excellent effect in bowel complaints, especially those of children. The astringency resides principally in the cortical portion, and hence the smallest roots should be preferred; of the *decoction* (a troyounce to water Oi) fʒij may be taken frequently.

Heuchera (*Alum-root*). The roots of Heuchera Americana, and other species of Heuchera (*Nat. Ord.* Saxifragaceæ), indigenous plants known under the common name of Alum-root, with radical leaves somewhat like those of the maple, and numerous radical flower-stems, one to two feet in height, with rose-colored flowers arranged in pyramidal panicles—possess very decided astringent properties, and may be used both externally and internally.

A large number of vegetable substances, both indigenous and foreign, have been used as astringents, in addition to those enumerated—the astringent principle being the most common medicinal quality with which plants are endowed.

The foregoing list comprises all the more important.

CREASOTUM—CREASOTE.

Creasote is a peculiar substance obtained from wood-tar, or from crude pyroligneous acid. When pure, it is a colorless, oleaginous liquid, with a caustic, burning taste, and a penetra-

ting, disagreeable odor, like that of smoked meat. Its sp. gr. (U. S. P.) is 1.046; its formula is variously given, ($C_{28}H_{16}O_4$), (and $C_{14}H_8O_2$). It forms two solutions with water, one of 1 part to 80 parts of water, the other of 1 part of water in 10 parts of creasote; and it is soluble, in all proportions, in alcohol, ether, naptha, and acetic acid. A remarkable property of creasote is its power of preserving meat, whence its name (from κρεὰς flesh, and σώζω, I save).

Effects and Uses.—Creasote, in large doses, is an acro-narcotic poison. In small doses, it is styptic and astringent, and, though not very nearly allied to the vegetable astringent articles, which contain tannic acid, it is, perhaps, more generally administered for its astringent than for any other properties. It is an excellent remedy in hæmatemesis, and is also employed in hæmoptysis and other hemorrhages. It is very efficacious in allaying vomiting and gastric irritability, and has been exhibited for its astringent virtues with good effect in diarrhœa, diabetes, and chronic bronchitis, and as a nervine in epilepsy, hysteria, neuralgia, &c. Externally, it is applied, in various degrees of dilution, to indolent, sloughing, and foul ulcers; in several cutaneous affections; as a gargle in putrid sore throat; and for the relief of deafness. In the concentrated form, it is a good styptic in capillary hemorrhages, and is applied with effect to the hollows of carious teeth for the removal of the pain of toothache. There is no antidote in cases of poisoning from creasote, but stimulants are to be freely administered.

Dose, internally, one or two drops, frequently repeated, in pill, or diluted with mucilage.

For external use, from two to six drops, or more, may be added to a fluidounce of distilled water.

Aqua Creasoti (*Creasote Water*) contains 3.72 minims in each fluidounce. Dose, f℥j–iv.

Creasote ointment contains half a fluidrachm of creasote in an ounce of lard.

ACIDUM CARBOLICUM—CARBOLIC ACID.

This substance, termed also phenic acid, phenilic acid, and phenilic alcohol, is a product of the distillation of coal-tar oil. It is made by treating the impure coal-tar of commerce with a weak alkaline solution, when it is resolved, on the addition of water, into a light oil and a heavier alkaline liquid; the latter is separated and neutralized with muriatic acid, and the impure carbolic acid, which is disengaged, is afterwards distilled from dried chloride of calcium, to remove water, when, upon exposing the distillate to a low temperature, carbolic acid congeals in the form of a colorless crystalline mass.

In its pure state, it is solid at ordinary temperatures, crystallizing in minute plates or long rhomboidal needles, white or colorless, of a peculiar empyreumatic odor like that of creasote, (but not identical with it), and an acrid burning taste. Its sp. gr. is 1.065, and it deliquesces upon exposure, and ultimately becomes liquid. When quite pure, it melts at 106° F., forming an oily-looking colorless liquid, which boils at 359° F. It is soluble in 20 parts of water, and very soluble in alcohol, ether, acetic acid, glycerin, and the fixed and volatile oils. Although it combines with salifiable bases, it does not act as an acid upon colors, or in neutralizing alkalies, and would be properly designated as *phenylic alcohol*, or the hydrated oxide of phenyl ($C_{12}H_5,O+HO$ or $C_{12}H_6O_2$).

Effects and Uses.—Carbolic acid is a local irritant, and, when applied to the skin or mucous membranes, produces severe pain, with a white eschar. Taken internally in large quantities, it acts as a powerful irritant poison. In small doses, its local effects upon the gastro-enteric mucous membrane resemble those of creasote, and after absorption (as shown by experiments upon the lower animals), it exercises a decided influence upon the nerve-centres. Its most interesting property, however, is its destructive influence upon the lower forms of vegetable and animal life, through which it arrests fermentation, and produces a powerful disinfectant and antiseptic

effect. It is used internally to check vomiting, as an astringent in diarrhœa, in sarcina ventriculi, as an anthelmintic, and in zymotic diseases, as scarlatina, diphtheria, &c. As an external application, its uses are still more important. It is employed in the concentrated form as a caustic in hospital gangrene, and to produce local anæsthesia, and in various forms of dilution, as an application in diphtheria, in cutaneous eruptions (especially those of organic origin), as a dressing to foul ulcers, abscesses, and sinuses, to compound fractures, to carbuncles, to burns and scalds, and, from its influence in coagulating albumen, as an hœmostatic. It is also a most valuable disinfectant. The dose, internally, is one or two grains, or, if liquified by heat, one or two drops, in sweetened water or glycerin. For disinfectant purposes, the impure liquid acid (which contains from 70 to 90 per cent. of carbolic and cresylic acids jointly), answers very well. Carbolates of soda and potassa have been also employed.

Recently, Sulpho-Carbolic Acid, ($C_{12}H_5O,SO_3+2HO$), and various salts of this acid have been employed. Sulpho-carbolic acid is thought to be a more efficient antiseptic and disinfectant than carbolic acid alone. The Sulpho-Carbolate of Zinc is believed to combine the virtues of zinc-salts and carbolic acid, and has been used with success internally in diarrhœa, in the same doses as the sulphate of zinc, and externally, in aqueous solution of from 3 to 6 grs. to the ounce, as an injection in gonorrhœa, and as a dressing for wounds and ulcers. Sulpho-carbolates of soda, potassa, magnesia, lime, and quinia have also been employed; they are recommended as antiseptics in cholera and zymotic diseases generally. The sulpho-carbolate of lead might be used where the acetate of lead is indicated and the corrective action of carbolic acid is called for, while its solubility in glycerin and alcohol adapt it to external application.

MINERAL ASTRINGENTS.

PLUMBI PRÆPARATA—PREPARATIONS OF LEAD.

Metallic lead is considered inert. The sulphuret and sulphate are probably also inactive; but, with these exceptions, all the compounds of lead possess more or less activity. When administered in therapeutical doses, they act as astringents in the alimentary canal, checking secretion, and causing constipation. After absorption, they produce a diminution in the volume and frequency of the pulse and in the activity of the secreting functions, and frequently arrest sanguineous discharges, both natural and artificial. In excessive doses, several of the saturnine compounds are irritant and corrosive poisons, giving rise to gastro-enteric inflammation. The proper *antidotes* are sulphuric acid, or some alkaline or earthy sulphate, in solution in a large quantity of diluent. The hydrated sesquisulphuret of iron is also said to act as an antidote. The *tests* for lead are sulphuretted hydrogen, and a solution of iodide of potassium; the former strikes a black, and the latter a yellow precipitate.

When the system becomes impregnated with lead, either from the too long-continued use of its preparations medicinally, from drinking water drawn through lead pipes, or from exposure to its influence in lead-factories, &c., a peculiar kind of *chronic poisoning* is produced, which shows itself in a variety of symptoms. The most usual form of lead-poisoning is *colic*, sometimes termed *colica Pictonum* or *painters' colic*, which is characterized by sharp abdominal pains, with hardness and depression of the abdominal parietes, obstinate constipation, nausea, vomiting, &c. Next in frequency is *lead arthralgy*, in which there are severe pains in the limbs, attended by cramps, hardness, and tension of the painful parts. *Lead paralysis* is another, though less common variety of the disease, and is characterized by a loss of voluntary motion, owing to the want of contractility of the muscular fibres of the affected parts. It most frequently affects the upper extremities

and the extensor rather than the flexor muscles. Occasionally, functional *disease of the brain* is also observed as one of the consequences of lead-poisoning. The absorption of lead into the system is recognized by a saturnine coloration of the gums, of the mucous membranes of the mouth, and of the teeth. The *antidotical* treatment of chronic lead-poisoning consists in the internal administration of solutions of sulphuric acid and of soluble alkaline and earthy sulphates, and in the use of baths of sulphuret of potassium, dissolved in warm water, by which the salts of lead, deposited on the skin, are converted into the insoluble sulphuret. The iodide of potassium is recommended as an *eliminative* remedy. For lead colic, a combination of cathartics and opiates has been employed; but the best remedy is alum in doses of ʒj or ʒij, every three or four hours, dissolved in some demulcent liquid. In the treatment of lead palsy, strychnia and electricity may be used, but it is a very intractable form of the disease. The use of sulphuric acid lemonade is resorted to, by workmen in lead factories, as a preventive of lead-poisoning. Milk has been found also to answer the same purpose. By passing a strong solution of the sulphuret of potassium or of sodium, heated to the temperature of 212° F., through leaden pipes, the interior surface will become coated with an insoluble sulphuret of lead, and the water distributed through them will be free from contamination.

Therapeutically, the preparations of lead are employed as astringents, sedatives, and desiccants. For internal use, the acetate is almost exclusively employed. It is a most valuable remedy in hemorrhages, from its combined sedative and astringent influence, and is also very serviceable in fluxes from the mucous membranes, particularly of the bowels. Topically, lead washes are employed to relieve superficial inflammation, to arrest morbid discharges, and as desiccants. They are objectionable, however, as eye-washes, from their often forming precipitates of lead upon the cornea, which are highly injurious.

Plumbi Acetas (*Acetate of Lead*). This salt (PbO,C_4H_3

O_3+3HO), known also as *Saccharum Saturni* or *Sugar of Lead*, is made by immersing lead in distilled vinegar, or litharge in pyroligneous or crude acetic acid. It occurs in colorless, needle-shaped crystals, which effloresce on exposure to the air. They have an acetous odor, and a sweetish, astringent taste, and are soluble in both water and alcohol. The mineral acids and their soluble salts, the alkalies and alkaline earths, and vegetable astringents, are *incompatible* with acetate of lead.

Effects and Uses.—The effects of this salt are those of the saturnine preparations, which have been already described. Its medicinal influence is sedative and astringent. In hemorrhages, it is more employed *internally* than any other remedy, usually in combination with opium. And this combination is also much resorted to in the treatment of diarrhœa, dysentery, and cholera, and may be prescribed with advantage to arrest the secretion of bronchitis and the night sweats of phthisis. In yellow fever, it is employed to check the hemorrhagic condition of the gastric mucous membrane. It is a dangerous remedy in chronic diseases, from the liability to lead-poisoning. As a *topical* remedy, acetate of lead, in aqueous solution, is extensively employed to relieve inflammation and diminish morbid discharges.

Dose, gr. j or ij to gr. viij or x, two or three times a day. When applied to mucous membranes, the strength of the solution may be gr. ss to gr. j or ij, to water f℥j—for phlegmonous inflammation, ℥ij to water Oj.

Liquor Plumbi Subacetatis (*Solution of Subacetate of Lead*). This preparation, frequently termed *Goulard's Extract*, is an aqueous solution of the diacetate of lead (2PbO, $C_4H_3O_3$), and is made by boiling acetate of lead and litharge in distilled water. It is a colorless liquid, which is decomposed on exposure to the air, with the formation of insoluble carbonate of lead, and occasions a dense white precipitate with solution of gum. In other respects it resembles a solution of acetate of lead.

Uses.—It is chiefly employed, diluted, to promote the resolution of external inflammation and arrest discharges from

suppurating, ulcerated, and mucous surfaces. The officinal dilution is *Liquor Plumbi Subacetatis Dilutus*, commonly known as *lead water*, and consists of solution f℥iij, to distilled water Oj. *Ceratum Plumbi Subacetatis*, or *Goulard's Cerate*, is made by mixing four troyounces of melted white wax with seven troyounces of olive oil, afterwards adding two fluidounces and a half of Goulard's extract, and thirty grains of camphor dissolved in a troyounce of olive oil; it is an admirable dressing to excoriated and blistered surfaces, burns, scalds, &c.

Plumbi Iodidum (*Iodide of Lead*) (PbI), is made by the double reaction of solutions of nitrate of lead and iodide of potassium. It is a bright-yellow, heavy, inodorous powder, sparingly soluble in cold water, but readily soluble in boiling water. It is chiefly used to reduce the volume of indolent tumors, and may be given internally in the dose of gr. iij or iv, or more, in pill; but it is principally employed externally in the form of *ointment* (℥j to lard ℥j).

Plumbi Nitras (*Nitrate of Lead*) (PbO,NO_5), made by dissolving litharge in diluted nitric acid, occurs in white, nearly opaque octohedral crystals, permanent in the air, of a sweet, astringent taste, and soluble in water and alcohol. It may be given *internally*, as a sedative astringent, in doses of gr. $\frac{1}{4}$ to gr. j, twice or thrice daily, in pill or solution. But its principal use is as a topical agent in the treatment of wounds, ulcers, and cutaneous affections. *Ledoyen's Disinfecting Fluid* is a solution of nitrate of lead ℥j in water f℥j.

Plumbi Oxidum (*Oxide of Lead*) (PbO) or *Litharge*, is obtained in the process for extracting silver from argentiferous galenas. It occurs in minute yellowish or orange-colored scales, insoluble in water, and is never employed *internally*. It is sometimes sprinkled over ulcers, but its chief use is in the preparation of *Emplastrum Plumbi* or *Lead Plaster* (called also *diachylon*), which is made by boiling litharge (thirty troyounces) with olive oil (fifty-six troyounces) and water, and is, chemically, a mixture of oleate and margarate of lead. It serves as a basis for most of the other plasters. *Emplastrum Saponis* (*Soap Plaster*), made by rubbing up soap (four troyounces) with lead

plaster (thirty-six troyounces), is an excellent discutient. *Soap Cerate* is made by melting together two troyounces of soap plaster and two troyounces and a half of white wax, and afterwards adding four troyounces of olive oil.

Plumbi Carbonas (*Carbonate of Lead*), or *White Lead* (PbO,CO_2) is manufactured in this country by exposing lead to the fumes of vinegar or acetic acid, carbonic acid being derived from the fermentation of tan, in which the pots containing lead are packed. It is a white powder, without smell or taste, and insoluble in water, and, as it occurs in commerce, is a compound of the carbonate and hydrate of lead, ($2PbO,CO_2+PbO,HO$). It is never administered *internally*, but is employed as a dusting powder—though there is danger of its absorption. *Unguentum Plumbi Carbonatis* (80 grains to ointment of lard ℥i) is a good application to burns, &c. White paint is used for the same purpose.

ALUMEN—ALUM.

Alum is a double salt, a sulphate of alumina and potassa ($Al_2O_3,3SO_3+KO,SO_3+24HO$). It is found native in Italy, in the neighborhood of Rome, but is usually manufactured from alum ores, and sometimes by the direct combination of its constituents. It crystallizes in regular octohedrons; but it is commonly found in the shops in large, colorless, transparent, crystalline masses, without any regular form. It has an astringent and sweetish, acid taste; by exposure to the air it slowly effloresces; it is soluble in cold water, and more so in boiling water; and, when heated, it undergoes the watery fusion, swells up, gives out its water of crystallization, and is converted into a white, spongy mass, called *dried alum*. The alkalies and their carbonates, lime-water, magnesia and its carbonate, tartrate of potassa, acetate of lead, and the vegetable astringents, are *incompatible* with alum.

Besides the potash alum, there are varieties in which the potash is replaced by some other base, as ammonia or soda;

ammonia alum is the common alum of commerce ($Al_2O_3,3SO_3+NH_4O,SO_3+24HO$).

Physiological Effects.—The immediate topical effect of alum is that of a powerful astringent, in virtue of a chemical action on the tissues. When it is applied to a part, in large quantities, the astriction is soon followed by irritation; and thus, taken internally in excessive doses, it gives rise to vomiting, griping, purging, and even inflammation of the gastro-enteric mucous membrane. After its absorption, it acts as an astringent on the system generally, and produces astriction of the tissues and fibres, and a diminution of secretion.

Medicinal Uses.—Alum is employed *internally* in hemorrhages, chronic diarrhœa, colliquative sweating, diabetes, &c., and it is sometimes combined with cubeb in the treatment of gleet, gonorrhœa, and leucorrhœa. It has been recommended in dilatation of the heart and aneurism of the aorta, and has also been given as an emetic in croup. Its use in lead colic has been alluded to. As a *topical* remedy it is extremely valuable as an astringent antiphlogistic, in ophthalmia, diphtheria, tonsillitis, &c.; to produce contraction of the tissues, in relaxation of the uvula, prolapsus ani, &c.; as a styptic in hemorrhages; and to arrest excessive secretion from the mucous surfaces.

Dose, gr. x to ℈j or ℈ij, in powder, or solution, or made into pills, with some tonic extract, and combined with an aromatic, as nutmeg, to prevent nausea. It may be agreeably given in the form of *whey*, prepared by boiling ℥ij with milk Oj, and straining, of which the dose is f℥ij. *Topically*, it is employed in the forms of powder, solution, and poultice, the latter of which is made by rubbing up whites of eggs with alum, and is applied to the eye in ophthalmia, between folds of linen. *Dried alum* (*alumen exsiccatum*), is employed internally in the dose of gr. v–x, and externally as a mild escharotic.

Aluminæ Sulphas (*Sulphate of Alumina*), is employed externally as an astringent and antiseptic application to ulcers, an injection in gonorrhœa, &c. The aqueous solution is used

to preserve bodies for dissection. A paste, made of a mixture of sulphate of alumina and sp. nitrous ether, applied to the cavity of a carious tooth, is a good remedy for toothache.

ORDER VI.—STIMULANTS.

Stimulants are medicines, which produce a rapid and temporary exaltation of the vital functions. Their influence is most conspicuous in conditions of morbid depression, when a marked tolerance of their action is established, and large amounts are borne. In health, when the powers of the system are at the normal standard, stimulants soon induce depression. *Topically*, they irritate and inflame the parts to which they are applied, and hence are classed with *irritants*.

They are employed principally in disorders known as asthenic, and in all conditions of the system attended with exhaustion. From their action in arousing the energies of the nervous system, they exercise a control over many nervous disorders, particularly those of a spasmodic nature. They are also frequently given with a view to their action on some one or other of the secretions. As stimulants to the gastro-intestinal canal, they are administered to promote digestion (when they are called *stomachics*), and to dispel flatulence (when they are known as *carminatives*). Topically, they are employed as *rubefacients*, *vesicants*, &c.

The more powerful and rapid stimulants are called *diffusible*. In overdoses, they act as violent narcotics and sedatives. The diffusible stimuli usually employed are vinous and spirituous liquors, and the preparations of ammonia. Vegetable stimulants which contain a volatile oil, are termed *aromatics*, and are usually given as stomachics and carminatives. Their volatile oils are also employed as local irritants.

DIFFUSIBLE STIMULANTS.

ALCOHOL.

Alcohol is a product which results from a process termed the vinous fermentation, in substances containing grape-sugar. At a temperature of 80° F., the presence of a fermenting body converts a solution of grape-sugar into alcohol and carbonic acid. Starchy substances, being convertible into grape-sugar, also yield alcohol. Alcohol is obtained from vinous or fermented liquors, by repeated distillation. It is, chemically, a hydrated oxide of ethyl, $C_4H_6O_2$, or C_4H_5O+HO. For officinal purposes, it should be of the specific gravity 0.835, when it contains about fifteen per cent. of water. It is a colorless, inflammable liquid, wholly vaporizable by heat, and unites in all proportions with water and ether. A *stronger alcohol, alcohol fortius*, sp. gr. 0.817, is made by shaking officinal alcohol with heated carbonate of potassa. This is free from water and fusel oil, and is used for pharmaceutical purposes.

Physiological Effects.—Alcohol is the intoxicating ingredient of all vinous and spirituous liquors. It is a powerful diffusible stimulant—in small doses, exciting the vascular and nervous systems, increasing the heat of the body, exhilarating the mental faculties, and stimulating the secretions. In excessive quantity, it acts as a narcotic poison, producing coma and death. The treatment in cases of poisoning from alcohol is the same as that which is to be pursued in cases of poisoning from opium. Ammonia is a physiological antidote. The habitual use of alcoholic stimuli in excess gives rise to a well-known train of mental and physical disorders: dyspepsia, visceral obstructions, cirrhosis of the liver, gout, dropsy, mania-a-potu, and even confirmed insanity. *Topically*, alcohol acts as an irritant.

Medicinal Uses.—Alcohol, in the form of vinous and spirituous liquors, is employed to rouse and support the system in asphyxia, syncope, the latter stages of acute attacks, typhoid and typhus fevers, asthenic and malignant diseases,

exhausting hemorrhages and suppurations, gangrene, to counteract the effects of the bites of venomous reptiles, in mania-a-potu, and in poisoning from foxglove, tobacco, and other narcotics: also as a stomachic in colic, flatulence, indigestion, nausea, &c. As a topical application, alcohol is used to produce cold by its evaporation; as a styptic; to harden the cuticle over delicate parts; and as a stimulant. Mixed with white of eggs, it forms a good coating to bed-sores.

Alcohol Dilutum (*Diluted Alcohol*), or *Proof Spirit*, consists of equal parts of alcohol and distilled water, and has a sp. gr. 0.941. It is used exclusively for pharmaceutical purposes.

Vinum (*Wine*). The fermented juice of the grape consists of water and alcohol in varying proportions, with volatile oil, œnanthic acid and ether, tannic, malic, and other acids, bitartrate of potassa, &c. Wine loses most of its cream of tartar by age. It is employed medicinally to support the system in typhus and typhoid fevers, exhausting chronic diseases, extensive suppurations, gangrene, &c. In typh-fevers, it constitutes our chief therapeutic resource, and may be administered to the amount of one or two pints, in the twenty-four hours, either pure, or in the form of *wine-whey*. This is made by adding from a gill to half a pint of white wine to a pint of boiling milk, separating the curd from the whey, and flavoring with sugar and spices.

The officinal wines are Vinum Xericum (*Sherry*), and Vinum Portense (*Port*). Port contains tannic acid, and is preferred in dysentery, diarrhœa, &c., for its astringency. *Madeira*, which is the strongest of the white wines, is an excellent stimulant, but may be objectionable from its acidity. *Champagne* is a pleasant stimulant, where gastric irritability is present. Madeira and Port contain about 23 per cent. of alcohol; Sherry, 19 per cent.; Champagne, 13 per cent. As articles of diet, the stronger wines, when used in excess, often produce gout, dropsy, and diseases of the kidneys and liver; and, except in advanced age, and in feeble constitutions, cannot but be considered as objectionable.

The *malt liquors* are useful where more permanent stimuli are called for, as in diseases tending to emaciation, chronic abscesses, &c. The best are porter and ale.

Spiritus Vini Gallici (*Brandy*), is obtained by the distillation of wine. It contains about 50 per cent. of alcohol, with water, volatile oil, tannic acid, coloring matter, &c. It is the best stimulus, where a rapid and decided impression is called for, as in collapse, syncope, &c.; and, from the tannic acid which it contains, is useful in bowel-complaints. *Rum* (*spiritus sacchari*), the ardent spirit obtained from sugar, and *whisky* (*spiritus frumenti*), obtained by the distillation of fermented infusions of corn, may be used as substitues for brandy. *Spiritus myrciæ* (*bay-rum*), the spirit obtained by distilling rum with the leaves of myrcia acris, is a refreshing local application. *Gin* is corn spirit flavored with juniper; and, owing to the oil of juniper, which it holds in solution, it is an active diuretic as well as stimulant. *Arrack*, the spirit of Eastern countries, is prepared from fermented infusions of rice.

Ammoniæ Præparata—Preparations of Ammonia.

Ammonia is a gaseous compound of hydrogen and nitrogen (NH_3), usually obtained by the action of lime on sal ammoniac (or muriate of ammonia). It is a powerful stimulant and local irritant, but is rarely used in medicine. The following preparations of Ammonia are employed as diffusible stimuli:

Aqua Ammoniæ Fortior (*Stronger Water of Ammonia*). This is an aqueous solution of ammonia, of the specific gravity 0.900. It is a colorless liquid, of a caustic, acrid taste, and a very pungent odor of ammonia; and is too strong for medicinal use, internally, in its unmixed state, containing 26 per cent. of gaseous ammonia. It is a powerful corrosive poison, for which the diluted acids, as vinegar, lemon juice, &c., are the proper antidotes. It is used externally as a vesicant, and has the advantage over cantharides of a more speedy operation and non-affection of the urinary organs.

Aqua Ammoniæ (*Water of Ammonia*), has a specific gravity of 0.960, containing nearly 10 per cent. of ammonia, and is employed as a stimulant, sudorific, antacid, and rubefacient. As a stimulant, ammonia is admirably adapted for speedily rousing the action of the vascular and respiratory systems, especially when it is an object at the same time to promote the action of the skin. For this purpose it is employed in low forms of disease, particularly in the typhoid exanthemata, in syncope, in asphyxia from narcotic poisons, and to counteract the effects of the bites of venomous reptiles. In dyspepsia, it is useful with a view to the relief both of acidity and flatulence. For internal use, other preparations of ammonia are generally preferred, and this is used chiefly as a rubefacient. As a *rubefacient*, the officinal *liniment* may be used (a fluidounce of water of ammonia to two troyounces of olive oil). Dose, internally, ten to thirty drops, largely diluted.

Spiritus Ammoniæ (*Spirit of Ammonia*) is a solution of ammonia in alcohol. It is given as a stimulant, antispasmodic, and carminative, in the dose of ten to thirty drops, diluted with water. But a pleasanter preparation, with similar properties, is

Spiritus Ammoniæ Aromaticus (*Aromatic Spirit of Ammonia*). This is made by dissolving a troyounce of carbonate of ammonia in three fluidounces of water of ammonia, previously mixed with four fluidounces of water, then dissolving two fluidrachms and a half of oil of lemon, forty minims of oil of nutmeg, and fifteen minims of oil of lavender, in a pint and a half of alcohol, afterwards mixing the two solutions, and adding water enough, to make the whole measure two pints. It is a very agreeable antacid stomachic and stimulant, and may be given in the dose of thirty drops to f℥j, or more, diluted with water.

Ammoniæ Carbonas (*Carbonate of Ammonia*). This salt, sometimes termed *volatile alkali*, is a *sesquicarbonate* ($2NH_4O$, $3CO_2$), and is prepared by subliming a mixture of muriate of ammonia and chalk. It occurs in whitish, transparent masses, wholly dissipated by heat, of a pungent, ammoniacal odor, an

acrid, alkaline taste, and is soluble without residue in water. On exposure to the air, it becomes opaque, falls into powder, and deteriorates by the loss of ammonia.

Effects and Uses.—Its indications are the same as those of solution of ammonia, to which it is preferred for internal exhibition as a diffusible stimulant. It is especially valuable in pneumonia, and by some therapeutists is relied on to the exclusion of other medication in this disease. It has also been recommended in diabetes, and in scrofula, attended with a languid circulation. Dose, gr. v to xx, in pill, or preferably in solution with gum and sugar. Mixed with some aromatic oil (as that of bergamot or lavender), it is used, as a *smelling salt*, in syncope, hysteria, &c.

ARNICA.

Arnica montana, Leopard's-bane (*Nat. Ord.* Asteraceæ), is a perennial, herbaceous plant, found in Northern Germany and other northern countries of Europe, and also in the northwestern portions of America. The FLOWERS are described by the U. S. Pharmacopœia as the officinal portion, but the article of commerce consists really of the HEADS, from which frequently the involucre has been removed: they are brought here from Germany. They are large, of a fine orange-yellow color, of a strong, disagreeable odor when fresh (which is diminished by desiccation), and an acrid, bitterish taste. The root also is used in Europe. Both contain a *volatile oil*, and an alkaloid principle termed *arnicina* has been found in them. Arnica is a stimulant, with emetic and cathartic properties in large doses. Its effects, internally, are not very well understood in this country, where it is little used, except *externally*, in the form of fomentation, or lotion, for the relief of bruises, sprains, and local paralysis. The *alcoholic extract* is given in doses of gr. v–x. This is chiefly used, however, in making a *plaster* (*emplastrum arnicæ*, one part of extract to two parts of previously melted resin plaster). The *tincture* (six troyounces to

diluted alcohol Oij) is used as a local stimulant, often mixed with soap liniment.

Phosphorus has been used, in small doses, as a diffusible stimulant; it is also diuretic and aphrodisiac. In overdoses, however, it is a most violent irritant poison, and is too dangerous for general medicinal use. Dose, gr. $\frac{1}{16}$ to gr. $\frac{1}{8}$, dissolved in almond or sweet oil, chloroform, ether, or oil of turpentine. It is probably converted into phosphoric acid in the stomach, and among the effects of its poisonous action, is the production of acute fatty degeneration of the tissues. In cases of poisoning from phosphorus, after the administration of an emetic, *magnesia* should be given, suspended in large quantities of water. The oil of turpentine is also recommended as an antidote.

The Phosphuret of Zinc has lately been employed in cases where the administration of phosphorus is indicated. It is prepared by passing the vapor of phosphorus over zinc heated to ebullition, in a current of dry hydrogen, and occurs as a gray crystallized body, unaltered by moist air, and easily decomposed in the stomach, with the evolution of phosphuretted hydrogen. Dose, about gr. $\frac{1}{6}$.

AROMATICS.

Aromatics owe their virtues to the presence of oils obtained from them by distillation, and termed volatile oils (*olea volatilia*), sometimes also *distilled* and *essential* oils. These oils possess, in a high degree, the odor and taste of the plants from which they are procured. Locally, they are powerful irritants, and, taken into the stomach in overdoses, act as acrid poisons. They pass partially into vapor at ordinary temperatures, and are completely volatilized by heat; hence, decoctions and extracts are improper preparations of the aromatics. The distilled oils are inflammable, very slightly soluble in water, but soluble in alcohol and ether. Their ultimate constituents are,

usually, carbon, hydrogen, and oxygen; and, on exposure to the air, they gradually absorb oxygen, become thicker, less odorous, and of a deeper color, and are finally converted into resins.

CAPSICUM—CAYENNE PEPPER.

Cayenne pepper is the FRUIT of Capsicum annuum and other species of Capsicum (*Nat. Ord.* Solanaceæ), American tropical plants, naturalized in most warm climates, and cultivated in our gardens. C. annuum is an annual, about two feet high, with an herbaceous, crooked, branching stem; ovate, pointed leaves; greenish-white flowers; and pendulous pod-like berries of a crimson or yellow color, two or three inches long. These pods, when dried and ground, form Cayenne pepper, the best of which is the *African*. Powdered capsicum has a bright-red color, which fades upon exposure to light; an aromatic, peculiar smell, and a bitterish, acrid, burning taste. The active principle is now believed to be an alkaloid, which should be termed *capsicia;* it is slightly soluble in water, but very much so in alcohol, ether, and oil of turpentine.

Effects and Uses.—Capsicum is principally employed as a *condiment* and *stomachic*, and is very useful in torpid conditions of the digestive organs, or as an adjunct to other remedies to rouse the susceptibility of the stomach. Its constitutional effect is not in proportion to its local effect, and it is therefore of no great efficiency as a diffusible stimulant. It has, however, been recommended in cynanche maligna and scarlatina anginosa. It is a good stomachic in the dyspepsia of drunkards. As a gargle, it is much employed in the sore throat of scarlatina, and also as a cataplasm to cause counter-irritation. Dose of the *powder*, gr. v to gr. x, in pill; of the *tincture* (a troyounce to diluted alcohol Oij), f℥j or f℥ij; of the *infusion*, which is used also for a gargle (half a troyounce to boiling water Oj), f℥ss. The *oleoresin* is a powerful rubefacient, and may be given internally in the dose of a drop.

PIPER—BLACK PEPPER.

Black pepper is the BERRIES of Piper Nigrum (*Nat. Ord.* Piperaceæ), a vine of the East Indies. The berries are gathered before they are quite ripe, and dried in the sun. They are wrinkled and black, in consequence of the drying of the pulp over the grayish-white seed, and in this state are known as *black* pepper. If permitted to ripen, and soaked in water till the outer coat is removed, they constitute *white* pepper. Pepper has an aromatic, peculiar odor, and a hot, spicy, pungent taste. Its properties are taken up by alcohol and ether, and partially by water. It contains a volatile oil, an acrid resin, and a peculiar alkaloid crystalline principle, called *piperin*, which has been used as an anti-intermittent remedy.

Effects and Uses.—Pepper is a warm carminative stimulant, chiefly employed as a condiment; but it is also a useful stomachic, and a good adjunct to bark in the treatment of intermittent fevers. Dose, gr. v to gr. xx. Of the *oleoresin* the dose is 1–3 drops.

CINNAMOMUM—CINNAMON.

There are two varieties of cinnamon: Ceylon cinnamon, which is the BARK of Cinnamomum Zeylanicum (*Nat. Ord.* Lauraceæ), a tree of Ceylon and Java; and China Cinnamon, or Cassia, the BARK of Cinnamomum aromaticum (*Nat. Ord.* Lauraceæ), a tree of China. The most esteemed is the *Ceylon* cinnamon. To obtain this, the bark is peeled from branches which are three years old; the epidermis is afterwards scraped off; the smaller quills are introduced into the larger ones, and they are then dried in the sun and made into bundles. It is found in the shops in long, cylindrical pieces, which are very thin and smooth, and of a yellow-brown color, and a splintery fracture. It has a fragrant odor, and a warm, sweetish, aromatic, slightly astringent taste. Its constituents are volatile oil, a little tannic acid, mucilage, an acid, lignin, &c. The

greater part, however, of the cinnamon brought to this country is the *cassia* cinnamon. It has the general appearance, smell, and taste of true cinnamon. But its substance is thicker, its texture coarser, its fracture shorter, its color darker, browner, and duller, and its flavor less sweet, and more pungent and astringent. Its properties are identical with those of the Ceylon variety.

Effects and Uses.—Cinnamon is an aromatic stimulant, with a slight astringency. It is used chiefly as a carminative, and as an addition to other medicines. Dose, gr. x to ʒss; of the *tincture* (three troyounces to diluted alcohol Oij), the dose is fʒj to fʒiij. *Oleum cinnamomi* (*oil of cinnamon*), is of a light-yellow color, which deepens by exposure to the air, with the development of an acid, termed *cinnamic;* dose, one or two drops. *Aqua cinnamomi* (*cinnamon water*), is prepared by rubbing up the oil with carbonate of magnesia, adding distilled water, and filtering.* It is used as a vehicle for other medicines. *Spiritus cinnamomi* (*spirit of cinnamon*), contains one part of the oil dissolved in fifteen parts of stronger alcohol; dose, ten to twenty drops. Cinnamon enters into a large number of preparations.

MYRISTICA—NUTMEG.

MACIS—MACE.

These products are portions of the fruit of Myristica moschata (*Nat. Ord.* Myristicaceæ), a tree of the Moluccas, cultivated also in Java and Sumatra, and other parts of the East Indies, and introduced into the isles of France and Bourbon, and several of the West India islands. It bears a pyriform fruit, about the size of a small peach, which has a fleshy pericarp, opened by two longitudinal valves. Within this is the ARILLUS, a scarlet reticulated membrane, which, when dry, be-

* The *waters* of the aromatic oils are all made by rubbing up half a fluid-drachm of the oil with 60 grains of carbonate of magnesia, then with two pints of distilled water, and afterwards filtering.

comes yellow-brown and brittle, and is termed *mace*. The KERNELS of the fruit are the *nutmegs*.

They are oval, of the size of an olive, of a greyish-brown color, marked with furrows; and to preserve them from the attacks of an insect, they are steeped in a mixture of lime and water. Mace has a pleasant, aromatic smell, and a warm, bitterish, pungent taste. Nutmegs have a delightfully fragrant odor, and a warm, aromatic, grateful taste.

Nutmegs contain a volatile oil, and by expression yield a fatty substance, known as "butter of nutmegs." From mace, also, a volatile oil is obtained by distillation.

Effects and Uses.—Nutmeg is one of the most agreeable of the aromatic stimulants, and is much employed for its carminative virtues, also as a flavoring ingredient, and to obviate the griping effects of cathartics. It is said to have narcotic properties, and hence may be useful in bowel-complaints. Mace is chiefly employed as a condiment. Dose of either, ℈j to ʒss. *Oleum myristicæ* (*oil of nutmeg*), is of a pale straw-color; dose 2 or 3 drops. *Spiritus myristicæ* is made by distilling two troyounces of nutmeg in eight pints of diluted alcohol and a pint of water to eight pints; dose, fʒj or fʒij.

CARYOPHYLLUS—CLOVES.

Cloves are the UNEXPANDED FLOWERS of Caryophyllus aromaticus (*Nat. Ord.* Myrtaceæ), an evergreen tree of the Moluccas. They are from five to ten lines long, and from one line to one line and a half thick, the corolla forming a ball or sphere at the top, and the calyx a tapering, somewhat quadrangular base, resembling a nail, whence the common name, from the French, *clou*. When good, they are of a dark-brown color, with a yellowish red tint; they have a strong, fragrant odor, a hot acrid taste, and, when pressed with the nail, should give out oil. They contain a volatile oil, tannic acid, resin, &c., and two crystalline principles, termed *caryophyllin* and *eugenin;* the oil consists of two oils, a heavy oil and a light oil.

Effects and Uses.—Cloves are among the most stimulating of the aromatics, but are chiefly used as a flavoring ingredient and as a condiment. Dose, gr. v to gr. x. The *infusion*, (℥ij, to boiling water Oj) is a warm, grateful stomachic. The *oil*, *oleum caryophylli*, is pale, or yellowish, becoming darker by age; dose, 2 to 6 drops.

PIMENTA—PIMENTO.

Pimento, called also *Allspice*, is the UNRIPE BERRIES of Eugenia Pimenta (*Nat. Ord.* Myrtaceæ), a handsome evergreen tree of the West Indies and South America. It comes exclusively from Jamaica, and consists of round, brown, roughish berries, rather larger than black peppercorns, with an external hard, brittle shell, inclosing two dark-brown seeds. They have an aromatic, agreeable smell, and a strong, clove-like taste. They are principally used as a condiment. The *oil*, *oleum pimentæ*, has a brownish-red color; dose, 3 to 6 drops.

OLEUM CAJUPUTI (*Cajeput Oil*). The volatile oil of the leaves of the Melaleuca Cajuputi (*Nat. Ord.* Myrtaceæ), a tree of the Moluccas, is a powerful diffusible aromatic stimulant, much employed in Eastern countries, and of late coming into use in the United States. It is a transparent oil, of a fine green color, a lively penetrating odor, analogous to that of camphor and cardamom, and a warm, pungent taste. It is an admirable stomachic, for the relief of nausea, and is also used as an antispasmodic stimulant in low fevers, spasmodic cholera, &c.; dose, 1 to 5 drops.

OLEUM TEREBINTHINÆ—OIL OF TURPENTINE.

Oil of turpentine, commonly called *spirit of turpentine*, is obtained by distillation from the turpentine of Pinus palustris and other species of Pinus (*Nat. Ord.* Pinaceæ). When pure, it is a limpid, colorless, volatile, and inflammable liquid, of a strong, penetrating, peculiar odor, and a hot, pungent, bitterish taste.

It is lighter than water, very slightly soluble in it, less soluble in alcohol than most other volatile oils, and readily soluble in ether.

Effects and Uses.—Oil of turpentine is stimulant, diuretic, blennorrhetic, and anthelmintic, and, externally, rubefacient. As a stimulant, it is a very valuable remedy in typhoid fever, particularly where the abdomen is tympanitic, the tongue dry, and the bowels are ulcerated. It is employed also with advantage in morbid discharges from mucous membranes, hemorrhages, rheumatism, nervous disorders, atonic dropsy, gleet, nephritic and calculous affections, and as an anthelmintic in tænia. Enemata of the oil of turpentine are particularly serviceable for the relief of tympanites. Externally, it is used for purposes of counter-irritation.

Dose, as a stimulant or diuretic, five to thirty drops, repeated; as an anthelmintic or as an enema, f℥ss to f℥ij.

ZINGIBER—GINGER.

Ginger is the RHIZOMA of Zingiber officinale (*Nat. Ord.* Zingiberaceæ), a perennial, herbaceous plant, growing to the height of two or three feet, with long, lanceolate leaves and yellow flowers. Its native country is unknown: but it has been cultivated in Asia from time immemorial, and was early introduced into the tropical regions of America. Ginger root occurs in flattish, jointed, branched or lobed, palmate pieces, which rarely exceed four inches in length. In the young state, the roots are preserved in sugar, and form a very pleasant sweetmeat. When old, they are taken up, scalded in hot water, and dried, when they are known as *black ginger*. Sometimes they are scraped, previously to being dried, and are then called *white*, or *Jamaica ginger*. The former comes from the East Indies; the latter, from the West Indies. The powder of black ginger is yellowish-brown; that of white ginger, yellowish-white. Both varieties have a powerful, peculiar odor, and a warm, pungent, aromatic taste. They impart their virtues to water and alcohol, and contain a pale-yellow volatile oil, resin, starch, &c.

Effects and Uses.—Ginger is a pungent, aromatic stimulant, much employed as a stomachic in flatulency and spasm of the stomach and bowels. It is also used as a condiment, and to correct the unpleasant taste and nauseating qualities of other medicines. A paste made of the powder and warm water is used as a counter-irritant. Dose, gr. x to gr. xx, in pill. An *infusion* (half a troyounce to boiling water Oj); a *tincture* (eight troyounces to alcohol Oij); and a *syrup*, made from the tincture, are all used. A *fluid extract*—dose, 20 to 30 drops, and an *oleoresin*—dose, 1 to 2 drops, have been lately introduced. *Troches of Ginger* are made by mixing the tincture (f℥j) with tragacanth (℥ij), sugar (twelve troyounces), and a little syrup of ginger.

CARDAMOMUM—CARDAMOM.

Cardamom is the FRUIT of Elettaria Cardamomum (*Nat. Ord.* Zingiberaceæ), a perennial plant, from six to nine feet high, found in the mountainous parts of Malabar. Three varieties of Malabar cardamoms are known in commerce: *shorts*, *short-longs* and *long-longs*, all furnished by the same plant. They are ovate-oblong, from three to ten lines long, coriaceous, ribbed, and of a grayish or brownish-yellow color; and contain a number of blackish or reddish-brown seeds, which have a pleasant, aromatic odor, and a warm, aromatic, agreeable taste. They yield a colorless volatile oil, a fixed oil, starch, &c.

Effects and Uses.—Cardamom is a very agreeable aromatic, devoid of acridity, and is much employed as a stomachic and carminative, and as an adjuvant and corrective of other medicines; dose gr. v–x. The *tincture* (four troyounces to diluted alcohol Oij) is the preparation chiefly used; dose, f℥j or f℥ij. The *compound tincture* contains cardamom (360 grains), and also caraway (120 grains), cinnamon (300 grains), cochineal (60 grains), percolated with diluted alcohol till two pints and six fluidounces of tincture are obtained, which is afterwards mixed with two troyounces of clarified honey.

PULVIS AROMATICUS (*Aromatic Powder*), consists of cinna-

mon and ginger, each two parts, cardamon seeds and nutmeg, each one part. Dose, gr. x to xxx. *Confectio aromatica* (*aromatic confection*), consists of aromatic powder rubbed up with an equal part of honey; it is a pleasant vehicle for other medicines.

CALAMUS—SWEET FLAG.

Fig. 16.

The RHIZOMA of Acorus Calamus (*Nat. Ord.* Orontiaceæ), an

indigenous marshy plant, with long, sword-shaped, radical leaves, is a valuable aromatic stimulant, with some tonic properties. It is found in the shops in somewhat flattened pieces, deprived of their epidermis, wrinkled, and of a yellowish-color, and has a strong, fragrant odor, and a warm, bitterish, aromatic taste. It contains volatile oil, resin, extractive, &c. Dose, ℈j to ʒj, or it may be given in *infusion* (a troyounce to boiling water Oj).

GAULTHERIA—PARTRIDGE-BERRY.

Gaultheria procumbens, Partridge-berry, or Tea-berry (*Nat. Ord.* Ericaceæ), is a small indigenous evergreen plant, with one,

Fig. 17.

and sometimes two reddish stems, a few inches in height, bright-green, obovate, coriaceous, serrulated leaves, and white, ovate, five-toothed flowers, followed by scarlet berries. The LEAVES are the officinal portion, and contain a very stimulant *volatile oil*, which, when first distilled, is colorless, but gradually be-

comes reddish, and is distinguished as being the heaviest of the volatile oils. An infusion of the leaves, and an essence or alcoholic solution of the oil, are in very general popular use as carminatives and stomachics.

AURANTII CORTEX—ORANGE PEEL.

The OUTER RIND of the FRUIT of Citrus vulgaris, or Bitter Orange, and Citrus aurantium, or Sweet Orange (*Nat. Ord.* Aurantiaceæ), is much employed as a flavoring addition to other medicines. The *flowers* (*aurantii flores*) yield the delightful volatile oil termed oil of neroli, and are used in the form of *orange flower water* (*aqua aurantii florum*) as an agreeable vehicle, possessing slight antispasmodic virtues; a *syrup of sweet orange peel* is used for flavoring mixtures.

The following aromatics, of the natural order LAMIACEÆ, are pleasant carminatives and stomachics:

LAVANDULA (*Lavender*). The FLOWERS of Lavandula vera, a small European shrub, cultivated in our gardens, about two feet high, with linear or lanceolate leaves, and purplish-gray flowers, which are gathered in June, and dried in the shade. They have an agreeable, fragrant odor, and a pungent bitter taste. The *oil*, which is of a pale-yellow color, may be used in the dose of from one to five drops. But the preferred preparations are the *Spirit* (*Spiritus Lavandulæ*), made by distilling the fresh lavender (24 troyounces) with alcohol (8 pints) and water (2 pints) to 8 pints, and the *Compound Spirit* (*Spiritus Lavandulæ Compositus*), which contains also oil of rosemary, cinnamon, cloves, nutmeg, and red saunders; dose, f℥j.

MENTHA PIPERITA (*Peppermint*), and MENTHA VIRIDIS (*Spearmint*), are European plants, naturalized in the United States. The HERBS of both are officinal, but the LEAVES only should be employed; they have an aromatic odor, and a pungent, somewhat bitter taste, followed by a sensation of coolness. They contain volatile oils, with some bitter extractive, &c. One to five drops of the *oils* may be given; but they are usually

administered in the form of *essence* or *spirit* (f℥ij to alcohol Oj), in the dose of ten to twenty or forty drops. A WATER is made by rubbing up either of the oils with carbonate of magnesia and water. The oil of peppermint is the stronger of the two.

ROSMARINUS (*Rosemary*). Rosmarinus officinalis, or Rosemary, a European evergreen shrub, cultivated in our gardens, contains a very stimulant *volatile oil*, which is chiefly used as an ingredient of rubefacient liniments. The TOPS are directed by the U. S. Pharmacopœia, but the LEAVES are usually found in commerce. A *spirit* is made by dissolving the oil in alcohol.

HEDEOMA (*Pennyroyal*). Hedeoma pulegioides, or Pennyroyal, is an indigenous annual plant, about a foot high, with oblong-lanceolate, serrated leaves, and small, pale-blue flowers, arranged in axillary whorls. The whole HERB is directed by the U. S. Pharmacopœia, but the LEAVES only should be used, which contain a light-yellow essential *oil*, similar in properties to the mint oils, but somewhat more powerful.

MONARDA (*Horsemint*). The HERB of Monarda punctata, or horsemint, an indigenous plant. The essential *oil* is used chiefly as a rubefacient.

ORIGANUM. The HERB of Origanum vulgare, or common Marjoram. The essential *oil* is an ingredient in stimulating liniments.

MARRUBIUM (*Horehound*). Marrubium vulgare possesses combined stimulant, tonic, and expectorant properties, and, in large doses, proves laxative. It is chiefly used in cough syrups and candies. The HERB is officinal, but the LEAVES should be preferred.

SALVIA (*Sage*). The LEAVES of Salvia officinalis, a European plant, cultivated in our gardens, are used as a condiment, and as a gargle in sore throat and relaxed uvula; they are slightly tonic and astringent, as well as aromatic.

THYMUS (*Thyme*). The HERB of Thymus vulgaris yields an essential oil, *oleum thymi*, which is often substituted for oil of origanum, and is used as an external application.

The following aromatic SEEDS are derived from plants of the natural order APIACEÆ:

FŒNICULUM (*Fennel*). The FRUIT of Fœniculum vulgare, a European plant, cultivated in our gardens. It may be used in infusion; the dose of the *oil* is 5 to 15 drops. *Fennel water* is officinal.

CARUM (*Caraway*). The FRUIT of Carum Carui, a European plant, cultivated in this country. Dose of the *oil*, 1 to 10 drops.

ANISUM (*Anise*). The FRUIT of Pimpinella Anisum, originally a native of Egypt, but now cultivated throughout the south of Europe. Dose of the *oil*, 5 to 15 drops. The *oil* of the fruit of Illicium anisatum, or Star Anise, an evergreen tree of Japan and China, possesses analogous properties to those of oil of anise, and is much used as a substitute for it.

CORIANDRUM (*Coriander*), the FRUIT of Coriandrum sativum, an annual plant of the south of Europe.

VANILLA.

This is the prepared, unripe CAPSULES of Vanilla aromatica (*Nat. Ord.* Orchidaceæ), a climbing plant of Cuba and Mexico. The pods, when gathered, are yellow, but by exposure to the sun, they assume a dark copper color. They are cylindrical, somewhat flattened, wrinkled, six or eight inches long, three or four lines thick, and contain a soft, black pulp, in which numerous small black seeds are embedded. Vanilla has a strong, characteristic, highly pleasant odor, and a warm, aromatic, sweetish taste; the interior pulpy portion is most aromatic. The composition of vanilla is not determined, but its aroma is probably due to a volatile oil, developed in the curing of the pod.

It is a mild diffusible stimulant, chiefly used, however, as a perfume and flavoring ingredient.

ORDER VII.—SEDATIVES.

Sedatives are medicines which diminish the force of the action of the circulation, by depressing the nervous influence. Many narcotics, it has been seen, act as sedatives: as some of the solanaceæ, aconite, hydrocyanic acid, &c. But under this head are usually classed the medicinal substances which are employed therapeutically to reduce excitement of the vascular system.

With sedatives may be included also the medicinal agents termed *refrigerants*, comprising nearly all the neutral alkaline salts, as well as those in which the acid predominates, and the vegetable acids. These substances have little power of diminishing the ordinary or healthy temperature; but they lower febrile heat, allay thirst, restore the secretions, and in this way are very useful adjuvants in the treatment of febrile complaints.

DIGITALIS—FOXGLOVE.

Digitalis purpurea, or Purple Foxglove (*Nat. Ord.* Scrophulariaceæ), is a biennial European plant, cultivated in our gardens, with an erect stem three or four feet high, large ovate-lanceolate, crenate, downy, and veiny leaves, of a dull-green color, and handsome bell-shaped crimson or purple flowers, arranged in a long terminal spike. The seeds and LEAVES are both active, but the latter only are employed, *from plants of the second year's growth;* and those from the wild plants are preferred, as the cultivated variety is thought to be inferior in virtue. The petioles are removed, and the leaves are then dried in baskets, in a dark place, in a drying-stove. When dried, they have a dull-green color, with a faint odor, and a bitter, nauseous taste, and afford a fine deep-green powder. Both leaves and powder should be preserved in well-stoppered bottles, covered externally with dark-colored paper, and kept in a dark cupboard. And, as their medicinal activity is im-

paired by keeping, they should be renewed annually. They contain a principle termed *digitaline*, which possesses similar properties to those of the leaves. It is white, inodorous, scarcely soluble in water, but very soluble in alcohol, and has been employed in medicine, in doses of from $\frac{1}{60}$th to $\frac{1}{30}$th of a grain.

Physiological Effects.—The ordinary results of the administration of digitalis, in *small and repeated doses*, are an increase in the secretion of urine and a reduction of the frequency of the pulse, sometimes accompanied by nausea; but these effects are not constant. The influence of digitalis over the pulse is more marked in weak and debilitated persons, than in those who are robust and plethoric. Its effects, too, in this particular, are more easily obtained in the recumbent than in the erect posture, owing to the less force required in the former position, to carry on the circulation. In the repeated use of small doses of this medicine, a *cumulative effect* is sometimes observed: its powers are not manifested for a certain time, and effects are suddenly produced, which are attributable to the whole amount administered, giving rise to dangerous and even fatal syncope. In morbid conditions of the circulation, where it is irritable, abnormally quick, or irregular, digitalis is considered to exercise a primary medicinal effect, in *steadying* the pulse and restoring its force, while it diminishes morbid frequency. As regards its diuretic action, it is probably rather indirect than direct, and is manifested only where dropsical effusions are removed under its influence. When too long continued, or taken in *excessive doses*, digitalis acts an acro-narcotic poison, producing effects similar to those of tobacco, lobelia, &c. In such cases, after evacuating the stomach, the diffusible stimuli, as brandy and carbonate of ammonia, should be administered. The quantity of digitalis, however, that may be given, without destroying life, is considerable.

Medicinal Uses.—From its sedative action on the circulation, digitalis has been used in fevers, inflammations, and hemorrhages, where bloodletting is inadmissible, as in hectic fever, tubercular hemoptysis, &c. In the treatment of diseases of the

heart and great vessels, it is a remedy of the greatest value, to reduce the force and frequency of the circulation. It is greatly esteemed in the treatment of dropsy; and in the varieties of this disorder, resulting from heart disease, it is more employed than any other remedy, from its combined sedative and diuretic influence. In delirium tremens, digitalis has lately been given in large doses, with excellent effect.

Administration.—Digitalis is best given in *powder*, of which the dose is gr. j, two or three times a day, to be gradually increased. An *infusion* is officinal (ʒj to boiling water Oss, with tincture of cinnamon fʒj); but water is a bad solvent. The *tincture* (four troyounces to diluted alcolol Oij), is a better preparation—dose, 10 to 20 drops, two or three times a day, to be gradually increased. The *alcoholic extract* is now introduced—dose, one-fourth of a grain, to begin with.

VERATRUM VIRIDE—AMERICAN HELLEBORE.

Veratrum viride, known as Swamp Hellebore, Meadow Poke, Indian Poke, &c. (*Nat. Ord.* Melanthaceæ), is an indigenous swampy plant, growing to the height of from three to six feet, with greenish-yellow flowers. The RHIZOMA is the officinal portion; it is an inch or two in length, thick and fleshy, with numerous whitish radicles, and is usually found in the shops in small pieces or fragments, of a dingy white color. It has a bitter, acrid taste, which leaves a permanent impression in the mouth and fauces. It yields its virtues to water and alcohol, and contains two alkaloids, one soluble in ether, the other insoluble in that menstruum, neither of them being identical (as was at one time supposed) with *veratria*. For the former alkaloid, the name *viridia* has been proposed; for the latter, *veratroidia*. Viridia has little or no local irritant action, produces neither vomiting nor purging, exerts no direct influence on the brain, but acts as a depressant of the spinal cord and of the circulation. Veratroidia is a local irritant, emetic, and sometimes a cathartic, and a depressant also of the circulation.

Viridia has been employed to produce the sedative action of veratum viride, having the advantage of being free from the nauseating and emetic influence which the plant itself often produces. Dose, gr. $\frac{1}{6}$ every hour.

Effects and Uses.—American hellebore is an active local irritant. Taken internally, it somewhat promotes the flow of urine, and in doses of about five grains proves emetic. In continued doses it produces a *marked sedative action on the circulation*, irrespective of the nausea induced, which indeed may be prevented by careful administration. It has not generally proved laxative. No fatal effects are recorded from its use; stimulants invariably counteracting any excessive sedation. Within a few years past, this medicine has been largely used in our Southern States in inflammatory and febrile affections, particularly pneumonia and typhoid fever, with a view to its sedative action. It has been also used in cardiac affections, and in gout, rheumatism and neuralgia. Dose, of the *powder*, gr. i–ij, to begin with; of the *tincture* (sixteen troyounces to alcohol Oij), 8 or 10 drops; of the *fluid extract*, 4 or 5 drops.

VERATRUM ALBUM—WHITE HELLEBORE.

The RHIZOMA of Veratrum Album (*Nat. Ord.* Melanthaceæ), a mountainous European plant, is found in the shops in small, rough, wrinkled, conical, cylindrical pieces, blackish externally, and whitish internally; its odor, in the dried state, is feeble; its taste at first sweetish, afterwards bitterish, acrid, and burning. It contains veratria, and other principles.

Effects and Uses.—White hellebore is a local irritant. In moderate doses, it stimulates the secretions, and depresses the pulse. In larger doses, it is a violent emetic and cathartic. It is an ancient remedy, now, however, from its severity of action, comparatively little used. Dose, gr. ij, to begin with. A *wine* is prescribed, and an *ointment*, in itch. As an *errhine*, it is sometimes mixed with five or six parts of powdered liquorice root, or other inert powder.

VERATRIA ($C_{64}H_{52}N_2O_{16}$) is usually obtained from Cevadilla, the seeds of Veratrum Sabadilla (*Nat. Ord.* Melanthaceæ), a plant of Mexico. It is made by evaporating a strong tincture of the seeds to the consistence of an extract, from which the alkaloid is dissolved by diluted sulphuric acid, and afterwards precipitated by magnesia. For purification it is dissolved in alcohol, from which it is evaporated, again converted into a sulphate, decolorized by animal charcoal, and finally precipitated by ammonia. When pure it is white, but is usually a grayish or brownish-white powder, without odor, and of a bitter acrid taste, producing a sense of tingling or numbness in the tongue; scarcely soluble in cold water, but readily soluble in alcohol. It has an alkaline reaction, and strikes an intensely red color with concentrated sulphuric acid. The most delicate test for veratria is Trapp's—a permanent lilac red color, resembling a solution of permanganate of potassa, afforded by heating it in muriatic acid. Its effects are locally those of an irritant, and, when rubbed on the skin, it causes a sensation of heat and tingling. Taken internally, in small doses, it stimulates the secretions and depresses the pulse, and in excessive doses, it is a violent poison, producing tetanic symptoms: it is without narcotic action on the brain, producing death from paralysis of the spinal cord. Stimulants and ethereal inhalation would be the proper treatment in case of poisoning. *Veratria* has been used *internally*, in nervous disorders, dropsies, gout, rheumatism, &c., in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$ repeated; but it is most used *externally*, in the form of *ointment* (gr. xx to lard a troyounce), or dissolved in alcohol, as an application to rheumatic and neuralgic parts.

GELSEMIUM—YELLOW JASMINE.

The ROOT of Gelsemium Sempervirens (*Nat. Ord.* Scrophulariaccæ), a beautiful climbing plant of our Southern States, possesses valuable sedative properties, without nauseating or purgative effects, and is employed in febrile and inflammatory

diseases. It has been found to contain a native acid, which has received the name of *gelseminic acid*, and a peculiar alkaloid, termed *gelseminia*, which is the active principle and is one of the most powerful poisons known. The *tincture* of gelsemium (four troyounces of the *root* to diluted alcohol Oj), is the form usually employed, in the dose of 20 to 50 drops.

ANTIMONII PRÆPARATA—PREPARATIONS OF ANTIMONY.

ANTIMONII ET POTASSÆ TARTRAS (*Tartrate of Antimony and Potassa*). This valuable salt, familiarly known as *tartar emetic*, is prepared by boiling water and cream of tartar with oxide of antimony. It occurs in colorless, transparent, rhombic, octohedron crystals, which become white and opaque from efflorescence on exposure to the air. When pure, its powder is perfectly white; but it is to be preferred in the crystalline state, as in this form it is less liable to adulteration. When dropped into a solution of hydrosulphuric acid, the crystals should have an orange-colored deposit formed on them. The powder is sometimes adulterated with cream of tartar, which may be detected by adding a few drops of a solution of carbonate of soda to a boiling solution of the antimonial salt, and if the precipitate formed be not redissolved, no bitartrate of potash is present.

Tartar emetic consists of 1 equiv. of tartaric acid, potash, and teroxide of antimony, each, with 3, or perhaps 2 equiv. of water of crystallization ($SbO_3,KO,C_8H_4O_{10}+2HO$). It is inodorous; has a nauseous, metallic taste; is very soluble in water; insoluble in pure alcohol; and is decomposed by the pure alkalies, alkaline carbonates, and the vegetable astringents.

Physiological Effects.—Tartar emetic is a powerful *local* irritant. Applied to the skin, it occasions an eruption of pustules, resembling those of variola or ecthyma. When taken into the stomach, in full doses, it causes vomiting, purging,

griping pains, &c.; and, in excessive quantity, it acts as an irritant poison, and has even produced death: very large doses have, however, of late years, been given medicinally with entire safety. The proper *antidote* is tannic acid; and opium, stimulants, and demulcents should be also administered. The *constitutional* effects of tartar emetic, when taken internally, in small doses, are an increase in the secretions and exhalations generally, especially from the skin; in somewhat larger doses, these effects are accompanied with nausea and vomiting, relaxation of the tissues (particularly the muscular fibres), a feeling of great feebleness and exhaustion, and a powerful sedative action on the circulation and respiration.

Medicinal Uses.—Tartar emetic is employed therapeutically as an emetic, nauseant, sedative, sudorific, and expectorant, and locally as a counter-irritant. As an *emetic*, it creates more nausea and depression than any other substance; and hence, while other emetics are to be preferred to it, when our object is merely to evacuate the contents of the stomach, with as little constitutional disturbance as possible, it is of the greatest value, when vomiting is resorted to as a means of making an impression on the system, and thereby checking the progress of disease. As a *nauseant*, tartar emetic is employed to relax the muscular system, in the reduction of dislocations, strangulated hernia, &c. As a *sedative antiphlogistic*, in large doses, it is a most powerful and valuable remedy in the treatment of acute inflammation, with fever, from its combined action in reducing the force of the circulation, moderating the heat of skin, and promoting diaphoresis. When given in this way, at intervals, tartar emetic ceases to produce emesis, and a *tolerance* of the medicine by the system is established. In the treatment of pneumonia, it has long been extensively resorted to. From gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$ may be given every two hours, in gradually increasing doses, until some amelioration of the symptoms takes place, when the doses are to be again decreased. As a *diaphoretic*, it is very useful, in small doses (as from gr. $\frac{1}{16}$ to gr. $\frac{1}{4}$, repeated), in continued fevers, inflammation from wounds, injuries, &c.; and as an *expectorant*, in

the same doses, it is employed in various pulmonary affections with advantage. As a *local irritant*, it is applied to the skin in the form of aqueous solution, ointment, or plaster, in chronic diseases of the chest, affections of joints, &c.

Administration.—The dose of tartar emetic, as an *emetic*, is gr. j or ij, and it is frequently combined with ipecacuanha. As a *sedative antiphlogistic*, gr. $\frac{1}{4}$ or $\frac{1}{2}$, to gr. j or ij; as a *nauseant*, gr. $\frac{1}{4}$ to $\frac{1}{2}$; and as a *diaphoretic and expectorant*, gr. $\frac{1}{16}$ to $\frac{1}{4}$, may be given in solution, and in each case repeated every two or three hours. For external use, the *ointment* (*unguentum antimonii*—℥ij to lard a troyounce) may be employed; or the *plaster*, made by mixing one part of tartar emetic with four parts of Burgundy pitch.

Vinum Antimonii (*Antimonial Wine*), is a solution of tartar emetic (gr. xxxij), in boiling distilled water (f℥j), and sherry wine (f℥xv). It is employed as an expectorant and sudorific, in the dose of from 10 to 30 drops, frequently repeated; and as an emetic for children, in the dose of 30 drops to f℥j, repeated every quarter of an hour.

Antimonium Sulphuratum (*Sulphurated Antimony*), is prepared by boiling the native tersulphuret of antimony with a solution of potassa, and adding diluted sulphuric acid to the strained solution; the sulphate of potassa, which is formed, being afterwards washed away with hot water. It is a reddish-brown, odorless, almost tasteless, insoluble powder, and is chemically a mixture of teroxide and tersulphuret of antimony. Its effects are analogous to those of tartar emetic; but it is chiefly employed as an *alterative* in cutaneous affections, secondary syphilis, &c., usually in conjunction with mercurials. Dose, as an *alterative*, gr. j to iij; as an emetic, gr. v to xx.

Antimonii Oxysulphuretum (*Oxysulphuret of Antimony*, or *Kermes Mineral*), is another mixture of tersulphuret and teroxide of antimony, prepared by boiling tersulphuret with an alkaline carbonate or caustic solution. It is an odorless, tasteless, brownish-red, insoluble powder, sometimes employed as an antiphlogistic in pneumonia; but it is uncertain in its operation, and probably possesses no advantage over tartar emetic. Dose, gr. $\frac{1}{2}$ to gr. ij, or iij.

By the addition of an acid to the liquor which remains after the precipitation of kermes, an orange-red, odorless, tasteless powder called *golden sulphur* of antimony, is obtained. It is a mixture of tersulphuret and teroxide with some free sulphur, and acts like kermes, but is weaker. Dose, gr. j to gr. ij, or iij.

Pilulæ Antimonii Compositæ (*Compound Pills of Antimony*), sometimes called Plummer's pills, contain equal parts of *sulphurated antimony* and of *calomel*, mixed with guaiac and molasses. They are used as an alterative in syphilitic, rheumatic, and cutaneous affections. Six grains of the mass contain a grain of calomel and antimony each.

Pulvis Antimonialis.—An *antimonial powder* is prepared in imitation of the celebrated *James's powder*, by burning sulphuret of antimony with hartshorn shavings or bone shavings. It is a white, gritty, tasteless, odorless powder, consisting of a mixture of antimonious acid and phosphate of lime, with some teroxide of antimony and a little antimonite of lime. It was formerly much employed in fevers; but it is unequal in its operation, owing its activity to the teroxide of antimony present. Hence, it has been dismissed from the U. S. Pharmacopœia. In the British Pharmacopœia, it is now directed to be made by mixing one part of oxide of antimony and two parts of precipitated phosphate of lime. Dose, gr. iij to viij.

Antimonii Oxidum (*Oxide of Antimony*) (SbO_3), is prepared from the sulphuret, and is a heavy, grayish-white, insoluble powder. It has the general therapeutic properties of the antimonials and, though not quite certain in its effects, is believed to produce the sedative operation of tartar emetic, with less nausea and derangement of the stomach. Dose, 2 or 3 grains repeated.

Antimoniated Hydrogen is a gaseous substance, which has lately been employed, with much success, by inhalation, in acute bronchitis and pneumonia. It is prepared, by forming an alloy of a drachm of pure antimony and twice the quantity of pure zinc, which is to be mixed with a drachm of tartar emetic or chloride of antimony, and introduced into a bottle

with a large tubulure; and from time to time, as the gas is wanted, from half a drachm to a drachm of muriatic acid is added. Muriatic acid gas is evolved at the same time, but this is prevented from reaching the respiratory orifices by closing them with a sponge wet with an alkaline solution, which permits the antimoniated hydrogen to pass. The gas may be breathed for five minutes every hour.

POTASSÆ NITRAS—NITRATE OF POTASSA.

This salt, commonly called *nitre* and *saltpetre* (KO,NO_5) occurs in both the inorganized and organized kingdoms of nature. It is obtained, for medicinal use, principally by the purification of the native nitre of India; and it is also found in *saltpetre caves* in various parts of the United States, associated with nitrate of lime, from which it is separated by lixiviation. It is artificially produced in several parts of Europe, in nitre beds or saltpetre plantations, by bringing together decayed organic animal and vegetable matters. And it is manufactured sometimes by the double decomposition of nitrate of soda and chloride of potassium. Nitre is *refined* by re-solution and crystallization of the *crude* nitre. As purified for medicinal use, it is found in the shops in large, transparent, colorless crystals, of the form of six-sided prisms with dihedral summits. They have no odor, a sharp, cooling taste, are soluble in water, and insoluble in pure alcohol. They have no water of crystallization, but frequently have a portion of the mother liquid, mechanically lodged in the spaces of the crystals, which may be driven off by heat, and the salt fused and cast into moulds.

Physiological Effects.—In *excessive doses*, nitre may act as a fatal poison, producing irritation of the alimentary canal and derangement of the nervous system. There is no antidote for it; and cases of poisoning are to be treated by demulcents, opiates, &c., after evacuation of the contents of the stomach. In *moderate doses*, it is a refrigerant, sedative, diuretic, and diaphoretic. and, in large or continued doses, laxative. Its refrigerant

properties are best seen when the body is morbidly hot, as in fevers. When mixed with the blood, after absorption, it produces several chemical changes, the most important of which is an *antiplastic* effect, by impeding coagulation.

Medicinal Uses.—Nitre is a very valuable refrigerant and sedative remedy in fevers, inflammations, hemorrhages, &c. In fevers it is often prescribed with calomel and tartar emetic, under the name of *nitrous powders* (nitre gr. x, tartar emetic gr. $\frac{1}{8}$, calomel gr. $\frac{1}{4}$ to $\frac{1}{2}$). In large doses, it was given formerly in acute rheumatism, and this practice has been lately revived with success in France. Dose, gr. x to ʒss. From ʒiv to ʒvj, are given in 24 hours, in acute rheumatism, and the quantity is increased to ʒviij, x, or xij. The fumes of paper, impregnated with nitre, are used with advantage in spasmodic asthma.

REFRIGERANTS.

SODÆ BORAS—BORATE OF SODA.

Borax occurs as a native product in several localities, the most important of which for a long time was Thibet, in Asia; it is also made artificially by the direct combination of native boracic acid, (obtained from the lagoons of Tuscany), with soda. The supply of the United States is now, however, exclusively derived from Borax Lake, in California, about one hundred miles north of San Francisco. Borax occurs in the form of hexahedral prismatic crystals, terminated by triangular pyramids, of a sweetish alkaline taste, and an alkaline reaction. It is a biborate of soda ($NaO,2BO_3$), with 10 eq. of water of crystallization, in the prismatic form, and 5 eq. when it occurs in the octohedral form. It is soluble in water, and slowly effloresces, and has the property of rendering cream of tartar very soluble in water.

Effects and Uses.—Borax is a mild refrigerant and diuretic, and has had emmenagogue virtues attributed to it. Dose, gr. xxx. It has been given in infantile diarrhœa as an enema,

and is used externally in cutaneous affections, especially as a detergent in aphthous affections of the mouth in children, mixed with equal parts of sugar. *Mel sodæ boratis* is made by mixing sixty grains of borax with a troyounce of clarified honey.

POTASSÆ CITRAS—CITRATE OF POTASSA.

This salt is made by saturating a solution of citric acid with bicarbonate of potassa, and evaporating to dryness. It is white, granular, deliquescent, and very soluble in water ($3KO,C_{12}H_5O_{11}$). It is an excellent refrigerant diaphoretic, much employed in febrile affections. Dose, gr. xx–xxv; ʒvj are usually dissolved in water Oss, and fʒss of the solution is administered every hour or two.

Liquor Potassæ Citratis (*Solution of the Citrate of Potassa*) is made by dissolving half a troyounce of citric acid and 330 grains of bicarbonate of potassa in half a pint of water—dose, fʒss.

Mistura Potassæ Citratis (*Mixture of Citrate of Potassa*, or *Neutral Mixture*), is made by saturating fresh lemon-juice with bicarbonate of potassa: or, when the lemon-juice cannot be had, a solution of citric acid, flavored with oil of lemons, may be used as a substitute. This preparation contains some free carbonic acid, which renders it more grateful to an irritable stomach than the ordinary solutions of the citrate. Under the name of *effervescing draught*, the citrate of potassa is often prepared extemporaneously and given in the state of effervescence.

LIQUOR AMMONIÆ ACETATIS—SOLUTION OF ACETATE OF AMMONIA.

This solution, termed also *Spiritus Mindereri*, or *Spirit of Mindererus*, is made by saturating diluted acetic acid with carbonate of ammonia, and is a solution of the acetate of

ammonia ($NH_4O,C_4H_3O_3$). When pure, it is a colorless liquid, with a saline taste. In small doses, it is refrigerant; in larger doses, diaphoretic, diuretic, and perhaps resolvent. It is employed in febrile and inflammatory affections, sometimes in conjunction with nitre or tartar emetic, sometimes with camphor and opium. Dose, f℥ss to f℥j, every two, three, or four hours, in sweetened water.

SPIRITUS ÆTHERIS NITROSI—SPIRIT OF NITROUS ETHER.

This preparation, commonly known as *Sweet Spirit of Nitre*, is a solution of nitrous ether in alcohol. It is obtained by distilling nitric acid with stronger alcohol and carbonate of potassa, and is a mixture, in variable proportions, of nitrous ether (C_4H_5O,NO_3) and alcohol. It is a colorless, volatile, inflammable liquid, soluble in water and alcohol, of a fragrant, ethereal odor, and a pungent, aromatic, sweetish, acidulous taste.

Effects and Uses.—Sweet Spirit of Nitre is antispasmodic, refrigerant, diaphoretic, and diuretic. It is much used in febrile affections, and, from its diuretic properties, is often combined with other diuretics in the treatment of dropsies. Dose, f℥ss to f℥j, frequently repeated.

ACIDA VEGETABILIA—VEGETABLE ACIDS.

The vegetable acids are refrigerant, and, when properly diluted, form useful drinks in fevers, &c. Those chiefly employed are *acidum aceticum* (*acetic acid*), *acidum citricum* (*citric acid*), and *acidum tartaricum* (*tartaric acid*). Acetic Acid ($C_4H_3O_3$) is employed only in the form of *diluted acetic acid* (one part of strong acid to seven parts of distilled water), or *vinegar* (*acetum*). Externally, strong acetic acid is employed as an escharotic to remove warts, in the cure of lupus, &c. It is less used internally as a refrigerant than citric acid, from its

liability to produce colic and diarrhœa, except in typhus, scarlet, and other malignant fevers, owing to its supposed possession of antiseptic virtues. Spongings with vinegar and water are useful to relieve the heat of skin in fevers, and the vapor is grateful to the sick. The dose of vinegar is f℥j–iv. Citric Acid may be agreeably administered in the juice of lemons, limes, sour oranges, and tamarinds. When these cannot be obtained, a solution of citric acid (℈j to water Oj) may be substituted. Citric acid is manufactured from lemon or lime juice, by saturating it with carbonate of lime, and afterwards decomposing the citrate of lime, which is formed, by the addition of sulphuric acid. It occurs in colorless crystals ($C_{12}H_5O_{11}+4HO$), having the form of rhomboidal prisms with dihedral summits, freely soluble in water, and soluble in alcohol; ℥ixss, added to distilled water Oj, form a solution of the average strength of lemon-juice. In the dose of f℥j every hour or two, *lemon-juice*, *limonis succus* (the juice of the fruit of Citrus Limonum), has been employed with much success in acute rheumatism and gout, and, though an uncertain remedy, is occasionally of undoubted efficacy. Properly diluted and mixed with sugar, it forms the delightful refrigerant known as lemonade. Lemon-juice is the best known remedy for scurvy. *Syrup of citric acid* consists of 20 grains of powdered citric acid and four minims of oil of lemon rubbed up with a fluidounce of syrup, and afterwards dissolved in a pint and fifteen fluidounces more of syrup, at a gentle heat. *Lemon syrup*, which is pleasanter, is made by dissolving 48 troyounces of sugar in a pint of strained lemon-juice mixed with a pint of water, at a gentle heat. Tartaric Acid is the acid of grapes, and is extracted from tartar, or crude cream of tartar. It is a white crystallized solid, in the form of irregular six-sided prisms ($C_8H_4O_{10}+2HO$), and is found in the shops as a fine, white powder. It is soluble in water and alcohol. Being cheaper than citric acid, it may be used as a substitute for that acid. It is employed in making *soda* and *Seidlitz powders*.

ORDER VIII.—SPINANTS.

Under the term, Spinants or Spastics, are comprised medicines which are employed to excite muscular contraction. To this class belong vegetable substances containing the alkaloids strychnia and brucia, which are employed therapeutically in torpid or paralytic conditions of the muscular system—and ergot, which is used to excite muscular contractions of the uterus.

NUX VOMICA.

Strychnos Nux vomica, or Poison-Nut (*Nat. Ord.* Apocynaceæ), is a middling-sized tree of the coast of Coromandel and other parts of India, which bears a round, smooth berry, the size of a pretty large apple, of a rich orange color, and containing numerous seeds embedded in a juicy pulp. The SEEDS are the officinal portion; but the bark also is poisonous, and is known as *false angustura bark*, from its having been confounded with angustura bark. The seeds are round, peltate, less than an inch in diameter, nearly flat, or convex on one side and concave on the other, and surrounded by a narrow annular stria. They have two coats: a simple, fibrous, outer coat, covered with short, silky hairs, of a gray or yellowish color, and a very thin inner coat, which envelopes the nucleus or kernel. This is hard, horny, of a whitish or yellowish color, and of very difficult pulverization. The seeds have no odor, but an intensely bitter taste, which is stronger in the kernel than in the investing membrane. They impart their virtues to water, but more readily to diluted alcohol, and contain two active *alkaloid* principles, *strychnia* (which is officinal), and *brucia*, both of which exist in combination with an acid called strychnic, or igasuric; another alkaloid, termed *igasuria*, much more soluble in water than the two first named, has been lately extracted from nux vomica.

Physiological Effects.—In very small and repeated doses,

nux vomica has a tonic and diuretic effect, and sometimes operates slightly on the bowels and skin. In somewhat larger doses, the stomach is often disturbed; and in still larger doses, the muscular system becomes disordered. A sense of weight and weakness in the limbs, and increased sensibility to external impressions of all kinds, manifest themselves, with depression of spirits and anxiety; the limbs tremble, and slight convulsive movements of the muscles appear. If the medicine be continued, convulsive paroxysms of the whole muscular system ensue, with erotic desires, painful sensations in the skin, and occasionally eruptions: the pulse is not much affected. In paralytic patients, the effects of the medicine are principally observed in the paralyzed parts. When taken in excessive doses, it produces tetanus, asphyxia, and death. There is no chemical antidote, unless, perhaps, tannic acid, and the iodu-retted iodide of potassium; after evacuating the stomach, opium, conium, ether, chloroform, extract of Indian hemp, camphor, tobacco, calabar bean, &c., may be exhibited, as physiological antidotes.

Medicinal Uses.—This medicine is our chief resource in torpid or paralytic conditions of the motor or sensitive nerves, or of the muscular fibre. When, however, paralysis is the result of inflammation of the nervous centres, it is injurious, and accelerates organic changes. It is most beneficial in those forms of paralysis which are independent of structural lesion, as lead palsy or paralysis from drunkenness. In paralysis, arising from cerebral hemorrhage,—after the absorption of the effused blood, and the paralysis remains, as it were from habit,—the cautious employment of nux vomica is often attended with advantage. In amaurosis, free from cerebral complication, it is sometimes useful; and it is occasionally serviceable in other nervous affections. It has also been found beneficial in chorea, constipation, dysentery, cholera, diarrhœa, impotence, incontinence of urine, and spermatorrhœa; and in small doses, it has been used as a general tonic, and as a stomachic in dyspepsia.

Administration.—Dose of the *powder*, gr. ij or iij, in pill,

several times a day, and increased till an effect is produced; of the *extract* (alcoholic), gr. ½ to gr. j, to be repeated and increased; of the *tincture* (eight troyounces to alcohol Oij), gtt. v to xx, and this is sometimes used as an embrocation to paralyzed parts.

STRYCHNIA ($C_{42}H_{22}N_2O_4$) is obtained by the following process: Nux vomica is digested and boiled in water acidulated with muriatic acid, and the resulting muriate of strychnia and brucia is decomposed by lime. The strychnia is separated from brucia and impurities, by boiling alcohol, from which it is deposited when cool, the brucia being left in solution. It is then converted into a sulphate by the addition of diluted sulphuric acid, next decolorized by animal charcoal, and again precipitated by solution of ammonia. Thus obtained, it occurs as a white powder, (but may be made to crystallize in the form of white, brilliant, rhombic prisms), of an intensely bitter taste, almost insoluble in water, slightly soluble in cold alcohol, but readily soluble in boiling alcohol. The usual *test* for strychnia is the bichromate of potassa, which, added to a solution of strychnia in concentrated sulphuric acid, produces a violet color, which after a time changes to wine-red, and then to reddish-yellow. A still more delicate test is a solution of permanganate of potassa (gr. 1) in sulphuric acid (grs. 2000). The effects of strychnia are similar to those of nux vomica, but more violent; its local action is that of an irritant. It is employed for the same purposes as nux vomica, and should be given in very minute doses, as gr. $\frac{1}{32}$ to $\frac{1}{16}$ to begin with, to be gradually increased and repeated. The salts of strychnia may be also employed in the same doses, but they are more soluble, and therefore more active; the *sulphate* is officinal. For *endermic* use, gr. ⅛ of strychnia may be used.

IGNATIA.

The SEED of Strychnos Ignatia, or St. Ignatius' Bean, a tree of the Philippine Islands, contains a large proportion of strych-

nia, and possesses medicinal properties analogous to those of nux vomica. It is used in this country in the form of *alcoholic extract*, which may be given to fulfil the same remedial indications as extract of nux vomica, in the dose of half a grain to a grain, three times a day.

TOXICODENDRON (*Poison-Oak*). The LEAVES of Rhus Toxicodendron, or Poison-Oak (*Nat. Ord.* Anacardiaceæ), an indigenous shrub from one to three feet high, and other species of Rhus, possess properties somewhat analogous to those of nux vomica, and have been employed with success in paralysis. They contain a peculiar *acid* principle (*toxicodendric acid*), to which their poisonous and medicinal activity is due. Dose, gr. j to gr. iij, or more, to be repeated and increased.

ERGOTA—ERGOT.

Ergot is incorrectly defined by the U. S. Pharmacopœia to be the DISEASED SEED of Secale cereale, or Rye (*Nat. Ord.* Graminaceæ). The disease was formerly considered to be the result of the presence of a parasitical fungus—but it is now known that ergot is really a fungus (Claviceps purpurea), growing from the diseased ovary of the plant. Its predisposing cause is unknown, and it is not peculiar to rye, many other grasses being subject to it, as abortion in grazing animals has been frequently produced by their eating grasses affected with ergot. The ergot usually projects out of the glum or husk of the plant beyond the ordinary outline of the spike or ear. It should not be collected until some days after it has begun to form, as it is thought not to possess full activity until about the sixth day of its formation. As found in the shops, it consists of cylindrical or somewhat prismatical tapering grains, curved like the spur of a cock, of a purplish color externally, and of a yellowish or grayish-white color within. Its smell is peculiar and nauseous; its taste is at first faint, but becomes bitterish, acrid, and disagreeable. It yields its virtues to

water and alcohol, and does not keep well, being liable to the attacks of a minute worm.

Numerous analyses have been made of ergot, but there is still uncertainty as regards its active principles. The *oil of ergot* is not now believed to be, when pure, the medicinal constituent. A volatile alkoloid, termed *secalia* (identical with *prophylamia*,* the odorous principle of pickled herring), exists in ergot; and, lately, two fixed alkaloids (*ergotina* and *ecbolina*), have been discovered, in combination with an acid termed *ergotic*. Ecbolina is believed to be the principle which causes uterine contraction, half a grain of it having been found to produce the effect of 30 grains of ergot.

Physiological Effects.—The effects of ergot, in medicinal doses, are unimportant on the male system. On the female, it excites powerful contraction of the uterus. *After labor has commenced*, in ten or twenty minutes from its administration, it increases the violence, frequency, and continuance of labor pains, which usually never cease until the child is born. Administered *before labor*, it frequently originates the process, though its effects in this respect are less constant. And even on the *unimpregnated uterus*, it produces painful contractions, and evinces an influence over morbid conditions of the organ, by checking uterine hemorrhage, and expelling polypi. In large doses, it produces vomiting, purging, and a marked sedative effect on the circulation, and in excessive quantity it acts as an acro-narcotic poison on both sexes. When it is used for a length of time as an article of food, it produces a peculiar morbid condition, termed ergotism, which assumes two forms,—one attended with convulsions, the other with dry gangrene of the limbs.

Medicinal Uses.—The chief employment of ergot is to promote the action of the uterus in parturition, when its expulsatory efforts are feeble and inefficient. It is, however, admissible, only when there is a *proper conformation of the pelvis and soft parts*, when the os uteri, vagina, and os externum are

* *Prophylamia* (C_6H_9N) has been used in rheumatism and neuralgia, in doses of two drops in some aromatic water, every two hours.

dilated, or readily dilatable, and when the presentation of the child is such as to offer no great mechanical impediment to delivery. It is also useful—when from any cause it is important to accelerate delivery; in women subject to flooding, given just before delivery; to promote the expulsion of the placenta, when it is retained from a want of contraction of the uterus; to expel clots, hydatids, polypi, &c.; to restrain uterine hemorrhage, whether puerperal or non-puerperal; to excite and promote abortion, &c.; and sometimes as a styptic. It has been employed, too, in gonorrhœa, dysmenorrhœa, paralysis of the bladder, purpura, and several other diseases. By many, ergot is believed to exercise a dangerous sedative influence on the *child* during labor, and its use may occasionally produce fœtal death, which a timely resort to the forceps would have prevented.

Administration.—Dose, of the *powder*, ℈j, every twenty minutes, till its effects are produced, or three doses are taken; of the *wine*, *vinum ergotæ* (two troyounces to sherry wine Oj), f℥j to f℥ij, repeated as above. The *fluid extract* (made with diluted alcohol and acetic acid), is the best preparation, (a fluidounce representing a troyounce of ergot)—dose, 20 to 30 drops.

Gossypii Radix (*Cotton Root*). The root of Gossypium herbaceum, the well-known cotton plant, is said by Southern physicians to possess decided influence in exciting uterine contractions. A *decoction* (made by boiling four troyounces of the inner bark of the root in a quart of water to a pint), has been used in doses of a wineglassful repeated. Cotton is a useful application to burns, and parts affected with erysipelas and rheumatism.

CLASS II.—ECCRITICS.

ORDER I.—EMETICS.

Emetics (from *εμεω*, I vomit), are medicines which are employed to promote vomiting; when they are used merely to excite nausea, they are termed *nauseants*. When an emetic is administered, usually within fifteen or twenty minutes afterwards, a feeling of nausea, relaxation, and faintness is experienced, with coolness and moisture of the skin, and a small, feeble, irregular pulse. These symptoms increase, till the contents of the stomach are ejected. During the act of vomiting, the face becomes flushed, the pulse is full and frequent, and the temperature of the body is increased. After vomiting is over, the skin is moist, the pulse soft and feeble, the patient becomes languid and drowsy, and, under peculiar circumstances, alarming and even fatal syncope has been induced. Vomiting is a reflex spinal act. Dr. Marshall Hall gives the following summary of its mechanism: "During the act of vomiting, 1, the larynx is closed; 2, the cardia is opened; and 3, all the muscles of expiration are called into action; but 4, actual expiration being prevented by the closure of the larynx, the force of the effort is expended upon the stomach, the cardia being open, and vomiting is effected."

Susceptibility to the action of emetics differs in different individuals and in different diseases. In fevers, and where gastric irritation is present, their influence is increased; and, on the other hand, when the brain is oppressed by disease or by narcotic medicines, the stomach is exceedingly insensible to their action.

Emetics are employed therapeutically: 1, to evacuate the stomach, for the purpose of removing poisons, undigested food, &c.; and with this view, the emetics should be selected which occasion least nausea and distress; 2, to expel foreign bodies lodged in the throat or œsophagus; 3, to excite nausea, and thereby depress the vascular and muscular systems; 4, to re-

lieve spasm, as in spasmodic croup; 5, to promote secretion and excretion, &c.; and 6, sometimes, to break up a train of morbid association, by giving a shock to the system, as in the forming stage of certain fevers, as typhus and scarlatina, and of delirium tremens. They are improper in congestion of the brain, pregnancy, hernia, &c. The act of emesis is promoted by the free use of tepid drinks; excessive vomiting may be checked by demulcents, opiates, counter-irritation to the stomach, &c.

VEGETABLE EMETICS.

IPECACUANHA.

Ipecacuanha is the ROOT of Cephaëlis Ipecacuanha (*Nat. Ord.* Cinchonaceæ), a small shrubby perennial plant of Brazil, where it grows to the height of about five or six inches. The roots, as met with in the shops, are in pieces about the size of a quill, several inches long, of an irregular, twisted, contorted shape, with numerous circular rings or rugæ, from which they have been termed *annulated*. When broken, they are seen to consist of two distinct parts,—a thin ligneous axis or centre, which is nearly inert, and a thick cortical layer, which has an herbaceous, acrid, rather bitter taste, and a slightly nauseous odor. A distinction is made of *brown*, *red*, and *gray* ipecacuanha, from differences in the color of the epidermis, but they are all derived from the same plant, and are the same in properties and composition; the *brown* is the most common variety in our market. The powder is of a light grayish-fawn color, and has a peculiar nauseous odor, which in some persons excites violent sneezing, in others dyspnœa. Ipecacuanha imparts its virtues to both water and alcohol, but they are injured by decoction. Its emetic property depends on the presence of a peculiar alkaline principle, termed *emetia* ($C_{60}H_{44}N_2O_{16}$), a whitish, inodorous, slightly bitter substance, sparingly soluble in water and ether, and very soluble in concentrated alcohol and chloroform. It produces vomiting in the dose of gr. $\frac{1}{4}$, and in overdoses may occasion dangerous and even fatal symp-

toms. Occasionally, a sophisticated root, that of *Psychotria emetica*, derived from New Granada, is found in the markets; this is not *annulated*, but longitudinally *striated*, and containing less than half the quantity of emetic, found in the genuine root (10½ per cent.).

Effects and Uses.—In full doses, ipecacuanha is a mild and certain emetic, well adapted to the treatment of spasmodic croup in children, and to all cases where a simple evacuation of the stomach is desired. In smaller doses, it produces nausea, depression of the pulse, expectoration, and diaphoresis, and with these views it is employed in the treatment of pulmonary affections, dysentery, and inflammatory disorders generally. In still smaller doses, it is useful as a tonic and stomachic. Ipecacuanha was first introduced as a remedy in dysentery, and, after being for a time laid aside, has been again recently used with marked success.

Administration.—Dose, as an *emetic*, gr. xv to gr. xx, often combined with a grain of tartar emetic; as a *nauseant*, gr. ss to gr. ij, three or four times a day; as an *expectorant* or *diaphoretic*, gr. ¼ to gr. ½, repeated; as a *tonic*, gr. $\frac{1}{10}$, repeated. *Vinum Ipecacuanhæ* (a troyounce to sherry wine Oj)—dose, as an *emetic*, f℥ss, as an *expectorant* and *diaphoretic*, ♏x to xxx; the *fluid extract* (made with acetic acid, alcohol, and water), is used as an addendum to expectorant and diaphoretic mixtures, a fluidounce representing an ounce of the root; one part of *fluid extract*, mixed with fifteen parts of simple *syrup*, makes *Syrupus Ipecacuanhæ*, an excellent preparation for children—f℥j containing gr. xxx of ipecacuanha; for a child a year or two old, f℥ss–j, may be given as an *emetic*, and v–xx drops, as an expectorant. *Pulvis Ipecacuanhæ Compositus*, *Compound powder of Ipecacuanha*, or *Dover's Powder* (see Opium, p. 49). *Troches of Ipecacuanha* contain also arrow-root, sugar, and mucilage, of tragacanth (ipecacuanha half a troyounce, arrow-root four troyounces, sugar fourteen troyounces, made into a mass with mucilage of tragacanth, which is to be divided into troches each weighing ten grains).

SANGUINARIA—BLOODROOT.

The RHIZOMA of Sanguinaria Canadensis, or Bloodroot (*Nat. Ord.* Papaveraceæ), a small indigenous plant, with radical, cordate, lobate leaves, and a handsome, white, eight-petalled

Fig. 18.

flower, which appears in early spring—is usually classed with emetics. When dried, it is in flattened pieces, much wrinkled and contorted, of a reddish-brown color, with a faint narcotic odor, and a bitterish, very acrid taste. It yields its virtues to water and alcohol, and loses them rapidly by keeping. An active alkaline principle, *sanguinarina* ($C_{34}H_{15}NO_8$), has been

obtained from it, which possesses the properties of the root, and two other alkaloids have been discovered in it.

Effects and Uses.—Bloodroot is an acrid emetic, and in large doses, an acro-narcotic poison. Locally, it acts as an irritant, and upon fungous surfaces as an escharotic. It is not much used as an emetic; but is occasionally employed with this view, in croup and diphtheria, or as a nauseant, in pulmonary affections. Dose, as an *emetic*, gr. x to xx, in pill; or in *infusion* (half a troyounce to boiling water Oj), of which f℥ss is the dose. *Tincture* (four troyounces to diluted alcohol Oij)—dose, as an *emetic*, f℥iij or iv; as an *expectorant*, 30 to 60 drops. It is also employed externally, dissolved in vinegar.

EUPHORBIA COROLLATA—LARGE FLOWERING SPURGE.

Fig. 19.

EUPHORBIA IPECACUANHA (*Ipecacuanha Spurge*). The ROOTS

of these indigenous plants (*Nat. Ord.* Euphorbiaceæ), possess emetic properties; but they are apt to operate on the bowels, and, in overdoses, prove extremely violent. Dose, gr. x to xv.

GILLENIA.

Gillenia trifoliata, Indian Physic, or American Ipecacuanha (*Nat. Ord.* Rosaceæ), is an indigenous herbaceous plant, with a perennial root, consisting of a number of fibres, arising from a tuber; one or more stems, two or three feet high, of a reddish-brown color; trifoliate leaves; and white flowers, with a tinge of red. West of the Allegheny Mountains, another species, G. stipulacea, is found, which is identical with the trifoliata in its properties, and is distinguished from it by having its lower leaves pinnatifid. The officinal portion of both is the ROOT. As found in the shops, it consists of pieces not thicker than a quill, wrinkled, of a reddish-brown color, and composed of an easily separable and pulverizable cortical portion, and a comparatively inert internal ligneous cord, which should be rejected. The bark has a feeble odor, and a nauseous, bitter taste, and makes a light-brownish powder.

Effects and Uses.—Gillenia is a safe and efficacious emetic, resembling ipecacuanha in its action, and, like it, in small doses proves a useful diaphoretic, expectorant, tonic, &c. Dose, as an *emetic*, gr. xxx; as an *expectorant* or *diaphoretic*, gr. ij to iv; and as a *tonic*, gr. $\frac{1}{4}$.

SINAPIS (*Mustard*). The POWDERED SEEDS of Sinapis nigra and Sinapis alba (*Nat. Ord.* Brassicaceæ), in doses of from a teaspoonful to a tablespoonful, are very useful emetics, particularly in atonic conditions of the stomach.

TOBACCO and LOBELIA act as emetics in large doses, but their employment is attended with danger, owing to the great prostration which they produce (see pp. 60, 62). SQUILL also possesses emetic powers, but it is too irritating for use in this respect.

MINERAL EMETICS.

TARTAR EMETIC. Dose, gr. j or gr. ij (see p. 188).
SULPHATE OF ZINC. Dose, gr. x to gr. xx (see p. 133).
SULPHATE OF COPPER. Dose, gr. iij to gr. v (see p. 132).
ALUM. Dose, a teaspoonful (see p. 162).

ORDER II.—CATHARTICS.

Cathartics (from καθαιρω, I purge), termed also *purgatives*, are medicines which produce evacuations from the bowels. Some operate by increasing the peristaltic motion of the intestines; others stimulate the mucous follicles and exhalants, and occasion watery evacuations, whence they are termed *hydragogues*. The more violent of the hydragogues, if given in overdoses, produce inflammation of the alimentary canal, characterized by violent vomiting and purging, abdominal pain and tenderness, cold extremities, and sinking pulse. From their activity, they are denominated *drastics*. Different cathartics affect different parts of the alimentary canal unequally, some acting more particularly on the upper portion, some on the lower, and others affecting all parts equally. Mercurial preparations purge chiefly by inducing a flow of bile from the liver.

Cathartics may be arranged into five groups: 1. *Laxatives*, which gently evacuate the contents of the bowels, without causing any obvious irritation, or affecting the general system. 2. *Saline cathartics*, which increase both the peristaltic action of the bowels and the effusion of fluids from the mucous surface, but are devoid of any stimulant action on the general system, and are therefore adapted to the treatment of febrile and inflammatory cases. 3. *Mild acrid cathartics*, which are acrid and stimulant, but not sufficiently violent in their local action to cause inflammation. 4. *Drastics*, comprising the more powerful and irritating cathartics, which, in large doses, act as acrid poisons. 5. *Mercurial cathartics*.

Cathartics are employed *therapeutically*,—1. To evacuate the bowels in constipation, and remove noxious matters, as retained feces, undigested food, morbid secretions, worms, poisons, &c. 2. To relieve inflammation, congestion, and plethora, by the depletion of the bloodvessels, which results from increased secretion and exhalation from the gastro-intestinal canal. 3. To promote absorption. 4. To affect remote organs, particularly the brain, through the agency of revulsion and counter-irritation. 5. To stimulate the secretion of the liver and pancreas, by irritating the orifice of the ductus communis choledochus. 6. To restore the catamenia, by the irritating or stimulating influence which they exert on the pelvic vessels. The more active cathartics are contra-indicated in cases of inflammation or ulceration of the gastro-intestinal mucous membrane, peritonitis, the advanced stages of typhoid fever, pregnancy, &c.

The operation of cathartics is promoted by the addition of small doses of emetics, and of the bitters. By combining those which act upon different portions of the alimentary canal, their operation is rendered less irritant, without any diminution of purgative efficiency. The griping and nauseating tendency of the drastic cathartics may be corrected by the addition of aromatics; carbonic acid water is a grateful vehicle for administering the saline preparations. Cathartics operate most speedily and favorably when given on an empty stomach, and susceptibility to their action is diminished during sleep, and increased by exercise. Mild diluent beverages promote their operation. In the event of hypercatharsis, opium should be administered by the mouth or rectum.

LAXATIVES.

Several articles of diet have a laxative operation on the bowels, and are useful in cases of habitual costiveness, as most of the ripe and dried fruits,—particularly tamarinds, peaches, apples, raisins, figs, and prunes,—West India molasses, honey, oatmeal, bran, &c.

The following medicinal substances are usually arranged under the head of *laxatives*, and are employed in cases where we wish to open the bowels with the least possible irritation,—as in children and pregnant women, in inflammations or surgical operations about the abdomen and pelvis, in typhoid fever, hernia, piles, affections of the rectum or womb, &c.

MANNA.

Manna is the CONCRETE JUICE, in *flakes*, of Fraxinus ornus, and of Fraxinus rotundifolia (*Nat. Ord.* Oleaceæ), small trees of Sicily and Southern Italy. It is obtained from incisions into the stems of the trees. The best kind is produced during the height of the season, when the juice flows vigorously, and from the upper stems, where it is less fatty. It is called *flake manna*, or *manna cannulata*, and consists of pieces from one to six inches long, one to two inches wide, and from half an inch to an inch thick, of irregular form, but more or less stalactitic, hollowed out on one side (from the shape of the tree or substance on which they are concreted), of a white or yellowish-white color, an odor like that of honey, and a sweet, afterwards rather acrid taste. A commoner manna, called *common manna*, or *manna in sorts*, is obtained from incisions later in the season, and from the lower stems. It occurs in small pieces, which seldom exceed an inch in length, and are softer, more viscid, and darker than the flake manna. A still inferior variety is termed *fat manna*, and consists of small, soft, viscid fragments, of a dirty, yellowish-brown color, mixed with a few pieces of the flake manna. Manna is soluble in both water and alcohol, and contains a white, crystalline, saccharine principle, termed *mannite*, (found also in mushrooms, the olive tree, and other plants,) some sugar, and a resin, to which it probably owes most of its purgative effect.

Effects and Uses.—In moderate doses, manna is nutritive; in larger, mildly laxative. It is principally given to children, to whom its sweet taste renders it acceptable; and it is some

times combined with the more active cathartics. It may be taken in substance, or dissolved in warm milk or water. Dose for an adult, ℥j to ℥ij; for children, ℥j to ℥iij.

CASSIA FISTULA—PURGING CASSIA.

This is the FRUIT of Cassia Fistula (*Nat. Ord.* Fabaceæ), a large tree of Egypt and the East Indies, now naturalized in the West Indies and South America. It consists of long, woody, dark-brown pods, about an inch in diameter, and nearly two feet in length, which contain numerous seeds imbedded in a soft black pulp. The PULP is the part used, and has a faint, nauseous odor, and a sweet, rather pleasant, mucilaginous taste. It is, in small doses, a mild, agreeable laxative, but its chief use is as an ingredient in the *Confection of Senna*. Dose, ℥j to ℥j.

OLEUM OLIVÆ (*Olive Oil*). The well-known OIL obtained from the FRUIT of Olea Europæa, or Olive Tree (*Nat. Ord.* Oleaceæ), is nutritive, demulcent, emollient, and laxative. It is frequently prescribed as a constituent of laxative enemata.

OLEUM AMYGDALÆ DULCIS (*Oil of Sweet Almond*), is used for the same purposes as olive oil.

OLEUM RICINI—CASTOR OIL.

Castor oil is the OIL obtained from the SEEDS of Ricinus communis, or Palma Christi (*Nat. Ord.* Euphorbiaceæ), a small perennial tree of India, now naturalized in many warm climates, and cultivated extensively in the United States. In this country, it is an annual plant, about five or six feet in height, with round, thick-jointed, furrowed stems, of a purplish color above; large peltato-palmate leaves, divided into seven or nine segments, on long round footstalks; and prickly, three-celled capsules, with a seed in each cell. The seeds are ovate, about the size of a small bean, and of a gray color, marbled with reddish-

brown spots and stripes. They possess considerable acridity, and, in large quantities, have produced death. They consist of a thin outer pellicle, an inner, hard, blackish shell—both of which are inert—and a white, oleaginous *kernel*, which contains the acrid principle.

Castor oil is obtained by expression, by decoction, and by the agency of alcohol. The first method is the best, and is that which is pursued in this country, where large quantities are made both for home consumption and exportation; heat should not be employed in preparing it, as it renders it rancid. Thus procured, it is nearly colorless, or of a pale-yellow color, of a thick viscid consistence, a faint, unpleasant odor, and a mild, nauseous taste, and becomes rancid and thick by exposure to the air. It is not soluble in water, but is extremely soluble in alcohol, readily so in ether, and forms soaps with alkalies. Its composition is not well understood: its constituents would seem to be mainly *ricinolein*, and a little stearin and palmitin.

Effects and Uses.—Castor oil is a mild and tolerably certain laxative, operating, when pure, without uneasiness in the bowels. It is admirably adapted to all cases where a free evacuation of the bowels is desired, without abdominal irritation, as in dysentery, pregnancy, typhoid fever, &c., and is an excellent purgative for children. The *leaves* are said to possess *galactagogue* properties, and are applied to the breasts, in the form of decoction, to induce the secretion of milk.

Administration.—For adults the dose is f℥ss to f℥j; for children f℥j to f℥ss. To cover its unpleasant flavor, it is sometimes taken floating on spirit, coffee, mint-water, compound spirit of ether, &c., or made into an emulsion, or mixed with the froth of porter, or a little oil of bitter almonds.

Flaxseed Oil and Melted Butter are laxative in the same doses as castor oil.

SULPHUR.

Sulphur exists in both kingdoms of nature. It is procured by the purification of native sulphur, and by the decomposition of the native sulphurets. The sulphur of commerce is generally obtained in the former way, chiefly from Sicily, and is termed *crude sulphur;* it comes also from Romagna in Italy, and from California, and very recently, considerable deposits of sulphur have been found in the island of Saba, one of the Dutch West Indies. After importation, it is purified by sublimation, and is known as SUBLIMED SULPHUR—SULPHUR SUBLIMATUM. It is sometimes sublimed in the form of an impalpable powder, when it is called the *flowers of sulphur*. Sometimes it is cast in wooden moulds and forms the roll sulphur or brimstone of commerce. Sublimed sulphur contains more or less sulphuric acid, and for medicinal use, it is further purified by washing, when it constitutes the SULPHUR LOTUM or WASHED SULPHUR of the Pharmacopœia. As met with in the shops, it is a fine bright-yellow powder, with a feeble odor and taste, insoluble in water, but soluble in alcohol, ether, chloroform, alkaline solutions, and the oils; and, when perfectly pure, it is wholly volatilized by heat, and ought not to change the color of litmus paper.

Effects and Uses. —In small and repeated doses, sulphur is a gentle stimulant to the skin and mucous membranes; and in larger doses, it acts as a mild purgative, without exciting the pulse or occasioning griping. It is employed in the cases to which laxatives are applicable, and also as an alterative diaphoretic in chronic cutaneous diseases, rheumatism, and gout, and as an expectorant in pulmonary affections. To increase its cathartic effect, it is often combined with cream of tartar or magnesia. *Externally*, it is a valuable remedy in various skin diseases, particulary *scabies*.

Administration.—Dose, ʒj to ʒiij or ʒiv, in syrup, treacle, or milk. *Externally*, it is applied in the form of vapor-bath or *ointment. Unguentum Sulphuris* consists of one part of sulphur and two parts of lard.

Sulphur Præcipitatum (*Precipitated Sulphur*, or *Lac Sulphuris*), is prepared by boiling together sulphur, slacked lime, and water, and afterwards precipitating the sulphur by muriatic acid. It is a finer and softer powder than sublimed sulphur, is of a paler yellow color, with a grayish tint, and is not gritty between the teeth. When exposed to the air, however, it is liable to become contaminated with sulphuric acid, and, as found in commerce, it is often adulterated with sulphate of lime. Its effects, uses, and doses are the same as those of sublimed sulphur.

SALINE CATHARTICS.

MAGNESIA.

Magnesia, sometimes called *calcined* magnesia, from the mode in which it is prepared, is procured by exposing the carbonate of magnesia to a red heat, till the carbonic acid is wholly expelled. It is a light, fine, white, colorless, odorless powder (MgO), of a feeble alkaline taste, very slighly soluble in water, and more soluble in cold than in hot water. *Henry's Magnesia*, a patent English medicine, has the advantage over the ordinary magnesia, of greater density and softness, and more ready miscibility with water. Magnesia, prepared by Mr. Husband, and Mr. Ellis, of Philadelphia, is very similar in properties to Henry's.

Effects and Uses.—Magnesia is antacid and laxative. A good deal of its cathartic effect is the result of its combination with the free acids of the stomach and intestines, in which soluble magnesian salts are formed. When taken in large quantities, and for too long a period, it sometimes accumulates in the bowels; and hence it is best to increase its solubility by giving it with lemonade. It is an excellent laxative where much acidity exists in the stomach; and is particularly useful in infantile cases. As an antacid, it is employed in heartburn, sick headache, and nephritic complaints. Dose, as a *laxative*,

℥j; as an *antacid*, ℈j, in water or milk. Of Henry's half the quantity.

MAGNESIÆ CARBONAS—CARBONATE OF MAGNESIA.

Carbonate of magnesia, sometimes called *magnesia alba*, is prepared by decomposing sulphate of magnesia with an alkaline carbonate. As found in the shops it is a combination of carbonate of magnesia and hydrate of magnesia, $3(MgO,CO_2+HO)+MgO,HO$. It occurs in the form of light white cubical cakes or powder; is inodorous, almost insipid, and nearly insoluble in water, but soluble in carbonic acid water.

Its *effects and uses* are nearly the same as those of calcined magnesia; but, from its effervescence with the acids of the stomach, it is apt to create flatulence, though sometimes, on this account, more acceptable to delicate stomachs. Dose, as a *laxative*, ℥j to ℥ij; as an *antacid*, gr. x.

MAGNESIÆ SULPHAS—SULPHATE OF MAGNESIA.

This salt, commonly called *Epsom Salt*, from its having been first procured from the Epsom mineral waters in England, occurs in native crystals, and is a constituent of sea-water and many saline springs. It is obtained in England from *dolomite*, or magnesian limestone; and also from *bittern*, or the residual liquor of sea-water, from which common salt has been separated. In this country it is extensively manufactured at Baltimore and Philadelphia, by the action of sulphuric acid on *magnesite*, the silicious hydrate of magnesia. It is usually met with in small acicular crystals, which are colorless, transparent, and odorless, but have an extremely bitter taste. They effloresce on exposure to the air, are very soluble in water and insoluble in alcohol. The chemical composition of the salt is one equivalent of acid, one of magnesia, and seven of water of crystallization (MgO,So_3+7HO).

Effects and Uses.—Epsom salt is a mild, safe, refrigerant

purgative, which, from its cheapness, is by far the most commonly employed of all cathartics. It is sometimes combined with senna, sometimes with the bitter infusions, and is most agreeably administered in solution in carbonic acid water. Dose, ʒj.

LIQUOR MAGNESIÆ CITRATIS—SOLUTION OF CITRATE OF MAGNESIA.

The citrate of magnesia, employed medicinally in solution, is termed the *two-thirds* citrate, and has the formula, $2MgO,HO,C_{12}H_5O_{11}$; it has never been obtained in a dry state. It is only in solution, with a slight excess of acid, and in the effervescing state, that it is officinal. The effervescing solution has a pleasant acid taste, without any thing disagreeable. It is a very grateful cathartic, and has lately been much employed as a substitute for Epsom salt. As prepared, according to the directions of the Pharmacopœia, the solution of citrate does not keep well, the amount of magnesia employed being too large. The following formula is better: Dissolve 450 grains of citric acid in four fluidounces of water, and to this add *gradually* 100 grains of ordinary magnesia, stirring till it is dissolved. Filter the solution into a strong twelve ounce bottle, containing one fluidounce of syrup of citric acid; then add 40 grains of bicarbonate of potassa, and water enough nearly to fill the bottle, which must be closed with a cork secured with twine; the mixture is to be shaken till solution occurs. From six to twelve fluidounces of the solution may be given.

SODÆ SULPHAS—SULPHATE OF SODA.

Sulphate of soda, commonly called *Glauber's Salt*, is a constituent of many mineral springs, and is prepared in various chemical processes. It occurs as a residuum in the manufacture of muriatic acid, made by adding sulphuric acid to chloride of sodium; and it is obtained from sea-water in the winter

season. It is found in colorless, six-sided, efflorescent crystals, which are inodorous, but have a cooling, saline, very bitter taste. It is soluble in water, more readily in hot than in cold water, and is insoluble in alcohol. Its chemical composition is one equivalent of soda, one of acid, and ten of water (NaO, SO_3+10HO).

Its *effects and uses* are very similar to those of Epsom salt, but it is more bitter and nauseous, and is now little used. It has an antiplastic action on the blood. Dose, ʒj; in an effloresced state, ʒss.

MANGANESII SULPHAS—SULPHATE OF MANGANESE.

This salt, lately introduced into the Pharmacopœia, is made by heating the native black oxide with concentrated sulphuric acid, and consists of one equivalent of sulphuric acid and one of protoxide of manganese (MnO,SO_3+4HO). It occurs in rhombic, prismatic crystals, of a pale-rose or pink color, and an astringent, bitterish taste. It is very soluble in water, insoluble in alcohol.

In its *effects* it is said to resemble *Glauber's Salt*, acting also as a cholagogue. Dose, as a purgative, ʒi–ij. As a tonic, it has been given in doses of gr. v–xx.

SODÆ PHOSPHAS—PHOSPHATE OF SODA.

This salt is prepared by digesting powdered burnt bone with diluted sulphuric acid, and decomposing the resulting superphosphate of lime with carbonate of soda. It occurs in large, rhombic, colorless, transparent, very efflorescent crystals ($2NaO,PO_5+10HO$), which are wholly soluble in water, and insoluble in alcohol, and have a pleasant saline taste, resembling that of common salt.

Effects and Uses.—Phosphate of soda is a mild saline cathartic, well adapted, from its agreeable taste, to the cases of children and delicate persons, but too expensive for general use. It is a constituent of the blood in health, and has been

recommended in cholera as a restorative of deficient saline matters, and also in diseases where there is a deficiency of phosphatic matter in the bones. Dose as a *cathartic*, ʒvj to ʒxij, in broth or soup; as an *alterative* ℈j or ℈ij, three or four times a day.

POTASSÆ SULPHAS—SULPHATE OF POTASSA.

This salt exists in both kingdoms of nature, and is obtained artificially from the residuum of the distillation of nitric acid, from nitrate of potassa and sulphuric acid. It occurs in small, hard, colorless, inodorous crystals (KO,SO_3), of a saline, bitter taste, which have no water of crystallization, and are unalterable in the air. They are moderately soluble in water, and are insoluble in alcohol.

Effects and Uses.—In small doses, it is considered a mild and safe cathartic; but, in large doses, it has proved a violent and even fatal poison, producing symptoms of cholera. It is thought to act as a *lactifuge*, or represser of milk, and is administered with this view in France. Dose, as a cathartic, gr. xv to ʒj, or ʒij; but it is little employed in this country. From its hardness and dryness it is useful to promote the trituration and division of powders, and for this purpose is employed in making Dover's powder.

POTASSÆ BITARTRAS—BITARTRATE OF POTASSA.

This salt, well known as *Cream of Tartar*, and termed also the acid tartrate of potash, exists in many vegetable juices, particularly the juice of grapes, from which it is obtained. It is deposited in an impure form, during fermentation, on the sides of wine-casks, and in this state occurs in crystalline cakes, of a reddish color, known as *argol* or *crude tartar*. This is purified by solution and crystallization, and forms a white crystalline mass or powder, termed cream of tartar. It is without smell, has an acidulous and gritty taste, is very slightly soluble in water, and insoluble in alcohol. Its chemical com-

position is one equivalent of potash, one of tartaric acid and one of water ($KO,HO,C_8H_4O_{10}$): the water acts the part of a base, as it cannot be expelled without decomposing the salt, which, when heated in a close vessel, is converted into a black flux, a compound of charcoal and carbonate of potash.

Effects and Uses.—In small doses, it is diuretic and refrigerant; in larger doses, cathartic; and, in excessive doses, it will produce gastro-intestinal inflammation. It is employed to form a refrigerant drink, and as a gentle aperient, in fevers; and as a diuretic and hydragogue cathartic in dropsies. Dose, as an *aperient*, ʒj or ʒij; as a *cathartic*, ʒss to ʒj; as a *diuretic*, ℈j to ʒj, in repeated doses. It enters into the *compound powder of jalap*.

POTASSÆ TARTRAS—TARTRATE OF POTASSA.

This salt, formerly called *Soluble Tartar*, is obtained by saturating the excess of acid in cream of tartar with carbonate of potassa. It occurs in white deliquescent crystals or grains, ($2KO,C_8H_4O_{10}$), of a saline, somewhat bitter taste, and is very soluble in water. It consists of two equivalents of potassa and one of acid. It is a gentle cathartic and diuretic, at present not much used. Dose, ʒss to ʒj.

POTASSÆ ET SODÆ TARTRAS—TARTRATE OF POTASSA AND SODA.

This salt, commonly called *Rochelle Salt*, is made by saturating the excess of acid in cream of tartar with carbonate of soda. It occurs in large, transparent, colorless, prismatic slightly efflorescent crystals, of a mildly saline and bitter taste, readily soluble in cold water, and still more so in hot water. It consists of 1 eq. of soda, 1 of potassa, 1 of acid, and 10 of water ($NaO,KO,C_8H_4O_{10}+10HO$). It is a mild and pleasant aperient, but it renders the urine alkaline, and should not therefore be given to persons suffering with phosphatic deposits in the urine. Dose, ʒss to ʒj. It is usually ex-

hibited in the form of *Pulveres Effervescentes Aperientes* (*Aperient Effervescing Powders*), or *Seidlitz Powders*, which consist of Rochelle salt (℥ij) and bicarbonate of soda (℈ij), in a blue paper, and tartaric acid (gr. xxxv), in a white paper. They are taken, dissolved in half a pint of water, while the liquid is in a state of effervescence, and form a very agreeable, mild aperient. They should not be kept in a damp place

MILD ACRID CATHARTICS.

RHEUM—RHUBARB.

Rhubarb is the ROOT of Rheum palmatum, and of other species of Rheum (*Nat. Ord.* Polygonaceæ). It is not known with certainty what species yields the officinal rhubarb, but it is attributed by most writers to R. palmatum, a perennial plant, with large, roundish, cordate, half-palmate leaves, growing spontaneously in Chinese Tartary and Mongolia, and cultivated in Europe and this country, together with several other varieties, for the leaf-stalks, which make excellent tarts. Rhubarb roots are prepared for the market by being cleansed, deprived of their cortical portion, cut into pieces, pierced through their centre, strung upon a cord, and dried in the sun. Three principal sorts were long known: Chinese, Russian or Turkey, and European. The first two were obtained, by different routes, from Central Asia. 1. *Chinese rhubarb* is the most common variety, and is imported principally from Canton. It occurs in roundish pieces, sometimes flattened, of a dirty brownish-yellow color externally (the cortical portion apparently scraped off), having a ragged fracture (which presents red, yellowish, and white veins), and it is often perforated with holes, with portions of the cord on which it was dried occasionally remaining. It has a peculiar odor, an astringent, somewhat bitter taste, is gritty when chewed, and tinges the saliva of a yellow color; its powder is yellowish, with a reddish-brown tinge. It is heavier than the Russian variety, and is generally inferior in quality to it; but the best pieces answer very well. 2.

Russian rhubarb had probably the same source as the Chinese, but it was selected with greater care, and was rigorously inspected by the Russian government. It was carried in caravans through Russia to St. Petersburg, whence it was exported. The pieces are irregular in shape, and are often angular, from the cortical portion having been cut off and not scraped. They are less heavy and compact than the Chinese, of a livelier color both externally and internally, and are perforated with larger holes, which have been made for the purpose of inspection. The taste and smell are very like those of the Chinese, but are more aromatic; the powder is bright yellow. Russian rhubarb has, however, within a few years past disappeared as an article of commerce, the Russian government having abandoned the inspection long practised on the frontiers of Bucharia, whence the supply was derived. 3. *European rhubarb* is of uncertain quality, and is seldom found in the shops. The kind most frequently met with is English rhubarb, which generally comes in pieces five or six inches long, and about an inch thick, and is called *stick rhubarb*. It is lighter, more spongy, and redder than the Asiatic varieties, with a feebler odor and less bitter taste.

Rhubarb imparts its virtues to both water and alcohol, but they are impaired by long boiling. Its most important chemical constituents are—*chrysophanic acid*, a yellow, odorless, tasteless, granular substance; two, or perhaps three *resins*, soluble in alcohol, and insoluble in water; and *bitter extractive*. It is supposed that the therapeutical properties of the drug depend chiefly on the conjoint operation of these principles. It contains also tannic and gallic acids, sugar, pectin, oxalate of lime, &c.

Effects and Uses.—In small doses, rhubarb is an astringent tonic. In larger doses, it is a slow and mild cathartic, occasionally causing griping and accelerating the pulse, but never inflaming the mucous membrane of the alimentary canal like the drastics. It is much employed as a purgative in *diarrhœa*, in which it is particularly useful from its secondary astringent effect, and in *dyspepsia*, attended with costiveness, where it acts

both as a stomachic and laxative. It is not adapted to febrile or inflammatory cases. In the bowel-complaints of children, rhubarb deservedly enjoys great popularity, and it is also highly esteemed in infantile scrofula. Made into a cataplasm, and applied to the abdomen, it acts as a purgative, on children.

Administration.—Dose, as a *stomachic laxative*, gr. v. to gr. x; as a *purgative*, ℈j to ʒj. The following are the officinal preparations: *Infusion* (ʒj to boiling water Oss), dose, fʒj to fʒij, repeated; *Extract* (alcoholic), dose, gr. x to gr. xxx; *Fluid Extract* (made with alcohol, and containing also sugar), dose, fʒss, containing half a drachm of the root; *Tincture* (ʒiij to diluted alcohol Oij, with cardamom ʒss); *Tincture of Rhubarb and Senna* (containing rhubarb a troyounce, senna and red saunders each 120 grains, coriander, fennel, and extract of liquorice, each 30 grains, raisins 6 troyounces, to diluted alcohol Oiij, and popularly known as *Warner's Gout Cordial*); *Tincture of Rhubarb and Aloes* and *Tincture of Rhubarb and Gentian* are no longer officinal; the dose of all the tinctures is fʒss to fʒj, and they are chiefly adapted to low forms of disease and persons accustomed to the use of stimulants; *Pills of Rhubarb* (rhubarb 360 grains, beaten with water into a pilular mass with soap 120 grains, and divided into 120 pills); *Compound Pills of Rhubarb* (rhubarb a troyounce, aloes 360 grains, myrrh half a troyounce, oil of peppermint half a fluidrachm, beaten with water into a pilular mass, and divided into 240 pills); *Compound Powder of Rhubarb* (containing 2 parts of rhubarb, 6 parts of magnesia, and 1 part of ginger); *Syrup* (fluid extract 3 fluidounces mixed with syrup 29 fluidounces); *Aromatic Syrup* (rhubarb two troyounces and a half, cloves and cinnamon each half a troyounce, nutmeg 120 grains, percolated with diluted alcohol till a pint of tincture is obtained, and this mixed with six pints of syrup—much used in infantile cases under the name of *Spiced Syrup of Rhubarb*), dose for an infant fʒi; and *wine* (rhubarb two troyounces, canella 60 grains, sherry wine 14 fluidounces, and diluted alcohol enough to make a

pint—dose f℥i–f℥ss). Roasting impairs the cathartic power of rhubarb, and is said to increase its astringency.

JUGLANS (*Butternut*). The INNER BARK of the ROOT of Juglans cinerea, or Butternut (*Nat. Ord.* Juglandaceæ), an indigenous forest tree, possesses cathartic properties, resembling those of rhubarb. Dose of the bark, or of the *extract*, which is preferred, gr. x to gr. xxx.

ALOE—ALOES.

Aloes is the INSPISSATED JUICE of the LEAVES of Aloe spicata, Aloe Socotrina, Aloe vulgaris, and other species of Aloe (*Nat. Ord.* Liliaceæ), succulent, herbaceous plants, growing in warm countries. The finest kinds are obtained by exudation: those prepared by expression and by boiling are inferior. Three principal varieties are known in commerce: Cape, Socotrine, and Barbadoes aloes, the first two of which are the most used in the United States. 1. *Cape aloes* (*aloe capensis*), which is much the most common, is obtained from the Cape of Good Hope, where it is collected indiscriminately from A. spicata and other species. It has a shining, resinous appearance, is of a deep-brown color, with a greenish tint, translucent at its edges, and has a glossy or resinous fracture. Its powder is greenish-yellow; its odor is strong and disagreeable, but not nauseous. 2. *Socotrine aloes* (*aloe Socotrina*), when genuine, is the choicest variety. It is produced in the island of Socotra, and on the eastern coast of Africa, from A. Socotrina, and occurs in pieces of a yellowish or reddish-brown color, becoming darker on exposure to the air, with a smooth and conchoidal fracture, the interior being lighter-colored than the exterior. Its powder is golden-yellow; its odor peculiar, but not unpleasant, and its taste bitter and disagreeable, but aromatic. *Socotrine aloes* should always be preferred, and is the variety directed by the Pharmacopœia in all preparations into which aloes enters.

Hepatic aloes is probably an inferior variety of Socotrine, and is seldom met with in our shops. It is of a reddish-brown color, but darker and less glossy than the Socotrine. 3. *Barbadoes aloes* (*aloe Barbadensis*), comes from the West Indies, the product chiefly of A. vulgaris; it is imported in gourds, weighing from sixty to seventy pounds. Its color is not uniform, varying from a dark-brown or black to a liver color. It has a dull fracture; makes an olive-yellow powder; and is distinguishable by its particularly disagreeable, nauseous odor. The taste of all the varieties of aloes is intensely bitter, and very tenacious.

Aloes yields its virtues to water and alcohol. A proximate neutral crystalline principle, termed *aloin*, has been extracted from it, which produces the cathartic action of aloes in doses of gr. j to gr. ij. It is slightly soluble in cold water, but readily soluble in hot water and alcohol.

Effects and Uses.—Aloes, in small doses, is tonic, and in large doses, purgative. As a cathartic it is remarkable for the slowness of its operation, and its special action on the large intestine and the pelvic viscera generally. Hence, it is objectionable in cases of hemorrhoids, irritation of the genito-urinary apparatus, pregnancy, &c.; and, on the other hand, is useful in amenorrhœa. It stimulates the hepatic secretion also. It is principally employed in cases of dyspepsia, accompanied by costiveness, dependent on a torpid condition of the large intestine or liver. It is also useful as a revulsive in cerebral affections, and has proved efficacious as an anthelmintic. As a purgative, it holds an intermediate rank between rhubarb and senna.

Administration.—Dose, gr. v to gr. x–xx, in pill; it is usually given in combination with other cathartics. Aloes is so often mixed with impurities, that, for medicinal use, it is best employed under the form of *aloe purificata* (*purified aloes*), which is prepared by straining and evaporating an alcoholic solution. The officinal preparations are: *Pills of Aloes*, consisting of equal parts of aloes and soap, one pill containing two grains of

aloes; *Pills of Aloes and Mastic*, three parts of aloes to one part of mastic and red rose, each; *Pills of Aloes and Assafetida*, consisting of equal quantities of aloes, assafetida and soap, useful in flatulent constipation; *Pills of Aloes and Myrrh*, or *Rufus's Pills*, aloes four parts, myrrh two parts, and saffron one part, made into pills with syrup, employed in amenorrhœa; *Powder of Aloes and Canella*, known as *hiera picra*, four parts of aloes to one of canella; *Tincture* (a troyounce to alcohol Oss, distilled water Ojss, with extract of liquorice three troyounces), dose, f℥ss to f℥jss; *Tincture of Aloes and Myrrh* (aloes and myrrh each three troyounces, saffron a troyounce, to two pints of alcohol); *Wine of Aloes* (aloes a troyounce, cardamom and ginger each 60 grains, to a pint of sherry wine).

LEPTANDRA.

The ROOT of Leptandra Virginica, Culver's Root, or Culver's Physic (*Nat. Ord.* Scrophulariaceæ), an herbaceous, perennial plant, three or four feet high, with leaves in whorls, and a long spike of white flowers, is now ranked as a valuable cholagogue cathartic. It consists of a dark-brown rhizoma, from two to four lines in thickness, several inches in length, with numerous long slender radicals. The odor is feeble and disagreeable, the taste bitterish, somewhat nauseous and acrid. Water and alcohol extract its virtues, which depend on a peculiar principle, termed *leptandrin*. Dose of the *powdered* root, gr. xx to ℥j; of an impure resin (made by precipitating a tincture of the root), gr. ij–iv; a *fluid extract* also has been used.

SENNA.

Senna consists of the LEAFLETS of several species of Cassia (*Nat. Ord.* Fabaceæ), small shrubs, which grow in the tropical regions of Asia and Africa. The species recognized as officinal are C. acutifolia, C. obovata, and C. elongata; and besides these, C. lanceolata, and C. Æthiopica, are also generally received as sources of the drug. The commercial varieties of senna, which are found in the United States, are the Alexandria, the Tripoli, the India, and the Mecca senna. 1. *Alexandria senna*, which comes from the port of this name in Egypt, is made up chiefly of the leaflets of C. acutifolia (which are yellowish-green, acute in shape, and less than an inch in length), intermingled with the pods, leafstalks, flowers, &c., of this plant. It contains also leaflets of C. obovata, known by their rounded, obtuse summits; and is, moreover, occasionally adulterated with the leaves of Cynanchum oleæfolium, distinguishable by their greater length, thickness, and firmness, from the genuine leaves. 2. *Tripoli senna*, brought from Tripoli, consists of the leaflets of C. Æthiopica, which are shorter, less acute, thinner, and more fragile than those of C. acutifolia, and are generally much *broken up*. 3. *India senna* is produced in Arabia, but comes into commerce through the ports of Hindostan. It consists of the leaflets, intermixed with the leafstalks and pods, of C. elongata, and is readily recognized by the long, narrow, *pike-like* shape, and dark hue of the leaflets. A finer variety of India senna, cultivated at *Tinnevelly*, in Hindostan, has been known for some years past, which is distinguishable from the common sort of India senna, by the bright-green color of the leaflets. 4. *Mecca senna* is a variety lately introduced, and consists of leaflets, intermediate in length between those of C. acutifolia and C. elongata, and has in mass a yellowish, tawny hue. Its source is not known with certainty, but it is probably the product of C. lanceolata. Cassia obovata has been lately found growing wild in abundance in Jamaica.

Commercial senna is prepared for use by separating the leaflets from the stalks, adulterations, &c.; the pods possess cathartic properties, but are less active than the leaves. The odor of senna is faint and sickly; its taste bitter, sweetish, and nauseous. It imparts its virtues to water and alcohol, its infusion being of a reddish-brown color. The chemical composition of senna has long been an unsettled point. By the latest analysis, it has been found to contain a glucoside, *cathartic acid* ($C_{180}H_{96}N_2O_{82}S$), which is insoluble in water, stronger alcohol, and ether. Catharto-mannite, sennepicrin, and a reddish-brown compound, soluble in ether, resembling chrysophanic acid, have been also obtained.

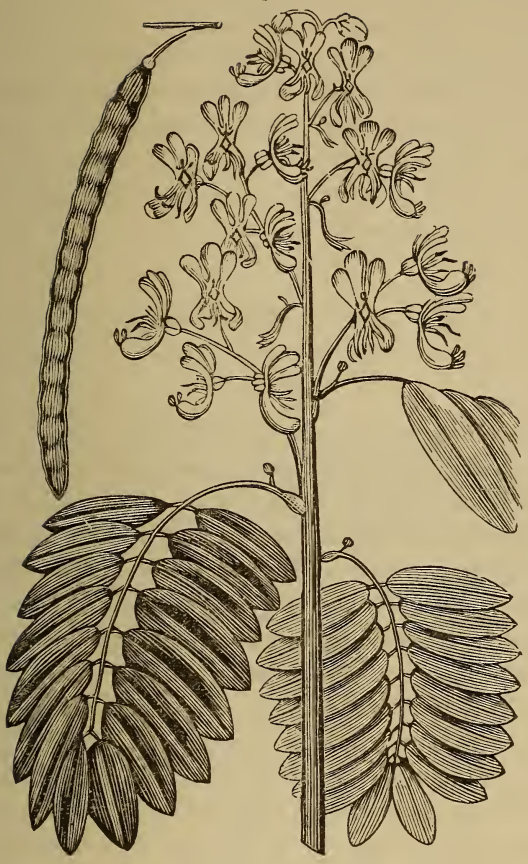
Effects and Uses.—Senna is a prompt, efficient, and safe cathartic, well adapted to febrile and inflammatory cases; it operates on the entire track of the intestinal canal, and produces watery, feculent discharges. Its tendency to gripe may in a great measure be counteracted by combining aromatics or neutral salts with it; the addition of bitters promotes its cathartic activity.

Administration.—The dose in *powder* is ℥ss to ℥ij; but it is usually given in *infusion* (a troyounce to boiling water Oj with coriander, ℥j), one-third for a dose, repeated. *Confectio sennæ* (made with senna, coriander, sugar, figs, and pulps of prunes, tamarinds, and purging cassia), is an excellent mild cathartic, much used for pregnant women; dose, ℥ij. Of the *fluid extract* the dose is f℥i to f℥ss.

CASSIA MARILANDICA—AMERICAN SENNA.

Cassia Marilandica, American Senna, or Wild Senna (*Nat. Ord.* Fabaceæ), possesses cathartic properties similar to those of imported senna, but is less active. It is an indigenous plant, common in the Southern and Western States, growing to the height of three or four feet, with alternate leaves, composed of from eight to ten pairs of oblong, lanceolate, pale-green leaflets, and bearing handsome golden-yellow flowers and a pendulous

Fig. 20.



fruit two to four inches long. An *infusion* of the LEAFLETS is given in doses one-third larger than those of senna.

SAMBUCUS—ELDER.

Several portions of Sambucus Canadensis, our indigenous *common elder*, (*Nat. Ord.* Caprifoliaceæ), a well-known shrub, from six to ten feet high, found in all the Atlantic States, possess medicinal properties. The *flowers*, which are officinal, are employed internally as a diaphoretic; externally as a discutient. The INNER BARK, which is without smell, and has a taste

at first sweetish, afterwards slightly bitter, acrid, and nauseous, and contains a resin, with valerianic acid, and other principles, is a hydragogue cathartic, and in large doses emetic. It is deemed a valuable remedy in dropsy, particularly in dropsy dependent on albuminuria, in which affection specific alterative virtues are attributed to it. It is given in *decoction* (an ounce boiled with two pints of water to a pint); dose, f℥iv. An infusion in cider is popularly employed.

DRASTIC CATHARTICS.

JALAPA—JALAP.

Jalap is the ROOT of Ipomæa Purga (*Nat. Ord.* Convolvulaceæ), a climbing plant of Mexico, which derives its name from the city of Jalapa, near Vera Cruz. The roots are imported either whole or in slices. When entire, they vary in size and shape from a walnut to a large pear, are hard and heavy—externally, brown and wrinkled, and internally, grayish. They have a heavy, sweetish, rather nauseous smell, and a sweetish, acrid, disagreeable taste. They yield their virtues partly to water, partly to alcohol, and completely to diluted alcohol. In the shops, jalap is kept in the state of powder, which is of a yellowish-gray color. Its active principle is a peculiar *resin*, which consists of two portions, one of which has been termed *rhodeoretin;* it contains also gum and starch, which is apt to be attacked by worms, the worm-eaten pieces becoming thus the most active.

Effects and Uses.—Jalap is a powerful hydragogue cathartic, operating with great promptness, and often causing much pain. In overdoses, it may produce dangerous hypercatharsis. It is employed as a hydragogue in dropsy, when it is often combined with cream of tartar; as a revulsive in cerebral and other affections, and to increase the activity of calomel in bilious fever. Dose, gr. xv to xxx; in combination, gr. x. Of the *extract*, which is made with diluted alcohol, and contains the resin and gum, the dose is one half that of jalap. The *compound powder* of jalap contains one part of jalap and two parts

of cream of tartar. The *resin* is extracted by solution in alcohol, and afterwards precipitated from the tincture by water (16 troyounces of jalap percolated with alcohol to four pints, then reduced to half a pint by distillation, and precipitated with four pints of water); dose, from four to eight grains. The *tincture* (six troyounces to alcohol, diluted with one-half a measure of water, Oij) is added to cathartic mixtures.

PODOPHYLLUM PELTATUM—MAY-APPLE.

Podophyllum peltatum, May-apple, or Mandrake (*Nat. Ord.* Ranunculaceæ), is a very common indigenous, herbaceous plant,

Fig. 21.

with a long, creeping, perennial root, and an upright stem about a foot high, separating at the top into two petioles, each sup-

porting a large peltate leaf, divided into five or six lobes. At the fork of the petioles, it bears a single flower, which appears in May, the fruit ripening in September. The RHIZOMA, which is the part used, is found in the shops in wrinkled, jointed pieces, about two lines in diameter, of a brown color externally, and yellowish within. The powder is yellowish-gray, and has a sweetish smell; its taste is at first sweetish, afterwards bitter, acrid, and nauseous. Diluted alcohol is the best solvent of podophyllum, which has been found to contain two *resinous* cathartic principles, both soluble in alcohol.

Effects and Uses.—This is an active hydragogue cathartic, with an especial determination to the upper portion of the alimentary canal, and a pretty decided cholagogue action. It is an ingredient in several cathartic nostrums. Dose, in *powder*, ℈j; of the *extract* (prepared like the *extract of jalap*), gr. v to gr. xv; of the *resin* (made in the same way as the *resin* of jalap), gr. ¼ to gr. j.

SCAMMONIUM—SCAMMONY.

Scammony is the CONCRETE JUICE of the ROOT of Convolvulus Scammonia (*Nat. Ord.* Convolvulaceæ), a twining plant of Syria. The finest kind is the product of exudation from the sliced root; but most of the drug which reaches us is probably obtained by expression. It comes from the Levant. Genuine scammony, termed *Virgin Scammony*, occurs in light, irregular, friable pieces, covered with a whitish-gray powder, and breaking with a bright-greenish fracture. The scammony of the shops, which is always more or less adulterated, is in hard, heavy, saucer-shaped cakes, from four to six inches in diameter (sometimes broken into pieces), of a dark ash or slate color. The powder is light-gray; the smell disagreeable, like that of old cheese; the taste at first feeble, afterwards bitterish and acrid. Scammony is a gum-resin, its active ingredient being *resin*, which constitutes from 80 to 90 per cent. of the weight of good scammony. Its proper solvents are alcohol and ether.

A factitious scammony, made in France, and known as *Montpelier Scammony*, is occasionally imported into the United States. It is blacker than the genuine article, has a feeble, balsamic odor, and a very bitter nauseous taste.

Effects and Uses.—Scammony is an energetic hydragogue cathartic, operating sometimes with great violence, and seldom given, except in combination with other cathartics. Dose, gr. v to gr. xv of the pure drug, gr. x to gr. xxx of the drug of the shops; of the *resin* (made by digesting six troyounces of scammony with successive portions of alcohol until exhausted, mixing the tinctures, afterwards reducing the mixture to a syrupy consistence by distilling off the alcohol, and then precipitating with a pint of water), gr. iv to gr. viij. This is much used in the form of *compound extract of colocynth.*

HELLEBORUS (*Black Hellebore*). The ROOT of Helleborus Niger, Black Hellebore, or Christmas Rose (*Nat. Ord.* Ranunculaceæ), a mountainous European plant, at one time enjoyed much reputation as a hydragogue cathartic and emmenagogue. It is now little used, and only as an emmenagogue. Dose of the *powdered root*, gr. x to gr. xx; of the *alcoholic extract*, gr. v to gr. x; of the *tincture* (four troyounces to diluted alcohol Oij), f℥ss to f℥j.

COLOCYNTHIS—COLOCYNTH.

Colocynth is the FRUIT (deprived of its rind) of Citrullus Colocynthis or Bitter Cucumber (*Nat. Ord.* Cucurbitaceæ), an annual plant of the south of Europe and parts of Asia and Africa, resembling the common watermelon. The fruit is *peeled* and dried for exportation, and comes to us from the Levant. It consists of light, whitish, spongy balls, about the size of a small orange, filled with numerous seeds. For medicinal use, the *pulp* only is employed, and the seeds, which are inactive, are rejected. The pulp has a feeble odor, and a nauseous, intensely bitter taste. It yields its virtues to

both water and alcohol, and contains a peculiar bitter principle termed *colocynthin*, resin, &c.

Effects and Uses.—Colocynth is a violent hydragogue cathartic, acting sometimes very harshly even in small doses, and in overdoses producing dangerous, and occasionally fatal enteric inflammation. The dose is gr. v to gr. x. It is seldom, however, administered alone. The *alcoholic extract* is made by depriving 48 troyounces of colocynth of seeds, grinding, macerating in 8 pints of diluted alcohol for four days, expressing, percolating the residue with diluted alcohol till the tincture and expressed liquid measure 16 pints; the alcohol is then recovered; and the residue evaporated to dryness and powdered. This is used chiefly in the preparation of the *compound extract*, which is made by mixing three troyounces and a half of alcoholic extract, twelve troyounces of aloes, three troyounces of resin of scammony, a troyounce of cardamom, and three troyounces of soap; this is a favorite prescription, but it is apt to gripe, and it is well to combine some aromatic with it, as a little oil of cloves or capsicum—dose, gr. v–x.

GAMBOGIA—GAMBOGE.

Gamboge is a GUM-RESIN, procured in Siam and Cochin-China, the CONCRETE JUICE of a tree which has never yet been examined by botanists. The juice is said to be collected, as it exudes from the wounded bark of the tree, in cocoa-nut shells, and is afterwards rolled into cylinders, or transferred to earthen jars to dry; it is sometimes also received into the hollow joints of the bamboo. It is imported from Canton and Calcutta, and occurs in cylindrical rolls from one to three inches in diameter, of an orange color, known as *pipe gamboge*, or in irregular masses (which are less pure), weighing two or three pounds or more, called *cake* or *lump gamboge*. Good gamboge is opaque, brittle, inodorous, nearly insipid, and breaks with a vitreous fracture; its powder is bright-yellow. It is a gum-resin, forming a yellow opaque emulsion with water, and a golden-yellow solution with alcohol.

Effects and Uses.—Gamboge is a powerful hydragogue, and in overdoses has proved fatal. It is employed in obstinate constipation—in dropsies, combined with cream of tartar or jalap—and has been given to destroy tænia. Dose, gr. ij to gr. vj. It is often prescribed with other and milder cathartics, to promote and accelerate their action. *Compound cathartic pills* are made by mixing half a troyounce of compound extract of colocynth, 180 grains of extract of jalap and calomel each, and 40 grains of gamboge, and with water forming a pilular mass, to be divided into 180 pills. Three of the pills, containing $10\frac{2}{3}$ grains of the mass, represent 4 grains of compound extract of colocynth, 3 of extract of jalap and calomel each, and $\frac{2}{3}$ grain of gamboge.

ELATERIUM.

Elaterium is a substance deposited by the JUICE of the FRUIT of Momordica Elaterium, Ecbalium agreste, or Squirting Cucumber (*Nat. Ord.* Cucurbitaceæ), an annual vine of the south of Europe, now cultivated in England. The fruit has the shape of a small oval cucumber, and, when fully ripe, separates from the peduncle, and throws out its juice and seeds with considerable force, through an opening in the base. Pure elaterium is obtained by slicing the fruit, and allowing the juice to drain through a sieve. The juice deposits a *sediment*, which dries in very light, thin, nearly flat, pulverulent, greenish-gray cakes, and is the genuine elaterium. It is almost inodorous, and has a bitter, acrid taste. The commercial elaterium, which is obtained chiefly from England, is made by expression. The drug is to be considered inferior when it is dark-colored, much curled, and hard. Elaterium yields its virtues to alcohol and not to water. Its active principle is called *elaterin*, and proves powerfully cathartic in doses of $\frac{1}{12}$ to $\frac{1}{20}$ of a grain.

Effects and Uses.—Elaterium is a hydragogue cathartic of great violence of operation, and in overdoses has frequently proved fatal. It has also a diuretic action. It is a very efficient remedy in the treatment of dropsies, and is also a useful

revulsive in cerebral affections; but, in administering it considerable caution is required. Dose of the *pure* drug (termed *Clutterbuck's elaterium*), gr. $\frac{1}{8}$; of the drug of the shops, gr. j to gr. ij; but it is most safely given in divided doses. Of *elaterin*, the dose is gr. $\frac{1}{2}$ to gr. $\frac{1}{16}$.

OLEUM TIGLII—CROTON OIL.

Croton oil is obtained from the SEEDS of Croton Tiglium (*Nat. Ord.* Euphorbiaceæ), a small tree of the East Indies. The Croton seeds resemble the Castor seeds in shape and size, and consist of a blackish shell, sometimes covered with a yellowish-brown epidermis, and enclosing a yellowish oily kernel. They are highly irritant and cathartic, but are not imported into this country. They contain a volatile oil, a FIXED OIL, resin, crotonic acid, &c. The CROTON OIL of the shops is obtained by expression, and is a mixture of the fixed oil proper, the resin, and crotonic acid. It is made both in India and England, the Indian oil being of a pale straw-color, and the English reddish-brown; the latter is the variety now found in the shops. It has a viscid consistence, which is increased by age, a faint peculiar odor, and an extremely acrid, pungent taste; it is soluble in ether and the volatile and fixed oils, and partially so in alcohol.

Physiological Effects.—Croton oil, taken internally, is a powerful hydragogue purgative, occasionally increasing also the secretion from the kidneys. One or two drops are usually sufficient to produce active catharsis, but sometimes as much as eight or ten drops may be taken without affecting the bowels. It operates very speedily, often causing evacuations in half an hour, and is apt to produce considerable depression of the vascular system. In overdoses it has frequently proved fatal. *Rubbed on the skin*, croton oil causes rubefaction and a pustular or vesicular eruption; and, rubbed over the abdomen, it will sometimes purge.

Medicinal Uses.—Croton oil, from the smallness of the dose

required, and the speediness of its action, is an extremely valuable purgative in obstinate constipation, and in cerebral disorders, particularly coma. As a *counter-irritant*, it is extensively employed in pulmonary and laryngeal affections, diseases of the joints, &c. Dose, one or two drops made into pill, with bread-crumb. For *external use*, it may be diluted with one or two parts of olive oil or oil of turpentine.

MERCURIAL CATHARTICS.

The preparations of mercury, employed as cathartics, are *calomel*, *blue pill*, and *mercury with chalk*. Their purgative effects depend partly on the increased flow of bile which they occasion, and partly on the stimulus which they give to secretion from the mucous follicles of the intestinal canal, and from the pancreas. They are rarely employed alone, owing to the slowness and uncertainty of their action; but are usually combined with, or followed by other cathartics (as jalap, senna, rhubarb, compound extract of colocynth, or some of the saline preparations). The mercurial cathartics are usually administered with a view of combining a purgative action with an effect on the secretions, particularly that of the liver; also, as anthelmintics; and as revulsives in cerebral and other affections. They are well adapted to infantile cases, from the facility of their administration, and are especially beneficial in the ephemeral febrile attacks to which children are subject; they, moreover, rarely produce salivation in children.

Hydrargyri Chloridum Mite (*Mild Chloride of Mercury, or Calomel*). (Noticed at length under the head of *Alteratives*). Dose, as a *cathartic*, gr. vj to xij, in pill or in powder, with syrup or molasses; to be followed, in from four to six hours, by some other cathartic. Sometimes, when it is exhibited with a view to a full action on the liver, gr. j or ij may be given every hour or two until the whole purgative dose is taken; or, it may be administered at bedtime, with an aperient draught the next morning. For children, larger doses are

required in proportion than for adults: gr. iij–vj may be given to a child from three to six years old. Calomel occasionally causes griping pain in the bowels, with bilious vomiting; this is attributable, not to any irritable qualities in the medicine, but to the acrid character of the bile secreted. Calomel is an ingredient of the *Compound Cathartic Pills.*

Pilulæ Hydrargyri (*Pills of Mercury*), commonly called *Blue Pills* (see *Alteratives*), are analogous in their cathartic action to calomel, but milder. They are given in about the same doses, and in the same combinations, &c.

Hydrargyrum cum Creta (*Mercury with Chalk*),—(see *Alteratives*),—combines antacid with mercurial effects. It is a very mild preparation—weaker than even blue pill. It is used as a laxative, in bowel-complaints and other affections of children. Dose, gr. v–xx for adults; for children, gr. ij or iij to viij or x, in *powder*, and not in pill.

ENEMATA.

In cases of irritability of the stomach—or with the view of hastening the action of cathartics taken by the mouth—or to remove feculent accumulations in the lower bowels—or to relieve tympanites—or for the purpose of revulsion, *cathartic enemata* are frequently administered.

When it is desired simply to open the bowels mechanically, tepid water, flaxseed tea, or other demulcent infusion may be employed. The common *laxative enema* consists of a tablespoonful of common salt, molasses, and lard or olive oil, each, in two-thirds of a pint of warm water; castor oil, or Epsom salt may be added to increase the cathartic effect. Senna tea, or some other cathartic infusion is often employed. To relieve flatulency, oil of turpentine (f℥ss to f℥j, in emulsion), or milk of assafetida (f℥ij to f℥iv), may be given. The latter is an excellent preparation in infantile cases.

ORDER III.—DIAPHORETICS.

Diaphoretics (from *διαφορεω*, *I transpire*), called also *sudorifics*, are medicines which promote transpiration from the skin. The action of the cutaneous exhalants may be increased by various means. The mere introduction of a large quantity of fluid into the system will produce sweating, if the skin be kept warm. Exercise and a warm temperature, by determining a flow of blood to the cutaneous vessels, act in the same way. Nauseants occasion diaphoresis, by relaxing the orifices of the cutaneous vessels; stimulants, by exciting them to increased secretion. Diaphoretics are employed therapeutically, for their evacuant, revulsive, and alterative effects, and to promote absorption. Different classes of diaphoretics are required for different morbid conditions.

1. *Nauseating Diaphoretics.*—Most of the *emetics*, in nauseating doses, produce a powerful relaxing diaphoretic action, and are much employed, with this view, in inflammatory cases, when not contraindicated by the presence of gastric irritability. The PREPARATIONS OF ANTIMONY (see p. 188), and IPECACUANHA (see p. 204), are chiefly resorted to as nauseating diaphoretics. Ipecacuanha is often given as a diaphoretic, in combination with opium, in the form of *Dover's Powder* (see p. 49).

2. *Refrigerant Diaphoretics.*—The saline and ethereal preparations classed as *refrigerants* (see p. 193), produce a gentle relaxing diaphoretic action, unattended with nausea. They are used to allay febrile excitement.

3. *Stimulating Diaphoretics.*—This group includes the diffusible stimulants, aromatic substances generally, of every class, and many narcotics, particularly opium and camphor. They are contraindicated in high inflammation, but are very serviceable in rheumatic and pulmonary affections, after vascular excitement has been reduced, and in all diseases where the surface of the body is cold. *Opium*, in the form of *Dover's Powder*, may be employed in inflammatory cases, where other stimulating diaphoretics are inadmissible, and is given with

advantage in an early stage of acute rheumatism, dysentery, and catarrh, unless the action of the pulse be very strong, when depletion should be previously resorted to. The operation of the diaphoretic stimulants is promoted by the free use of warm diluent drinks, and warm covering to the body.

4. *Alterative Diaphoretics.*—Under this head are comprised a class of diaphoretic medicines, which produce a gradual and nearly insensible increase of the cutaneous secretion, and are supposed to promote the elimination of noxious matters from the blood, through the vessels of the skin. They are employed chiefly in chronic rheumatic and cutaneous affections, and in secondary syphilis.

ALTERATIVE DIAPHORETICS.

SARSAPARILLA.

The name Sarsaparilla is applied to the ROOTS of Smilax officinalis and other species of Smilax (*Nat. Ord.* Smilaceæ), twining, prickly shrubs of Mexico, Guatemala, and the warm countries of South America. The roots consist of numerous wrinkled, slender pieces, of the average thickness of a writing quill, several feet long, springing from a common head or rhizoma, and are frequently found in the shops with portions of the stems attached. Several varieties are known: 1. *Honduras Sarsaparilla*, the most common variety in the United States, comes in bundles two or three feet long, composed of several roots folded lengthwise, of a dirty grayish or reddish-brown color. 2. *Jamaica Sarsaparilla*, which is probably derived also from Central America, comes in shorter bundles, and is known by the red color of the epidermis. 3. *Vera Cruz Sarsaparilla* comes in large, loose bales, bound with cords or leather thongs, containing the roots folded on themselves, consisting of a head with numerous long radicals. 4. *Brazilian* or *Rio Negro Sarsaparilla* is distinguished by the amylaceous character of its interior structure. 5. *Guatemala Sarsaparilla* resembles the Brazilian.

Sarsaparilla roots are several feet in length, about the thickness of a goose-quill, cylindrical, more or less wrinkled longitudinally, and consist of a whitish-brown, or pink cortical portion, covered with a thin gray, brown, or red epidermis, and inclosing a layer of whitish ligneous fibre, and a central pith. The *cortical portion* is more active than the interior portions; the central medulla contains a good deal of starch. Sarsaparilla, in the dried state, is nearly inodorous, but its decoction has a strong smell. It has a mucilaginous, slightly bitter taste, and, when chewed for some time, produces a persistent acrid impression on the mouth; this acridity of taste is the criterion of good sarsaparilla. Water and diluted alcohol extract its virtues, but they are impaired by long boiling. It contains an active principle, called *smilacin* or *sarsaparillin*, starch, resin, extractive, &c.

Effects and Uses.—The physiological effects of sarsaparilla, beyond a slight diaphoretic action, are not very obvious; in large doses, it occasionally produces nausea and vomiting. Its efficacy, however, in eradicating various morbid symptoms is well established, and its mode of action, though obscure, is generally attributed to a purifying influence on the blood, through the function of the skin. It is employed in secondary syphilis, particularly where the disease resists or is aggravated by the use of mercury; also in chronic rheumatism, skin diseases, and cachectic conditions of the system generally.

Administration.—Dose, of the *powder*, ʒss, three or four times a day—not much used, however, in this form. The *compound decoction* is made by macerating six troyounces of sarsaparilla, a troyounce of bark of sassafras root, guaiacum wood, and liquorice root, each, and 180 grains of mezereon, in 4 pints of water for 12 hours, then boiling for a quarter of an hour, and adding water enough to make the decoction measure 4 pints—dose, fʒiv–vi, 3 times a day. The *compound syrup* (which contains also guaiacum wood, pale rose leaves, senna, liquorice root, and the oils of sassafras, anise, and partridge-berry), is a favorite preparation: corrosive sublimate should not be given with it, as it is decomposed into calomel. Dose,

f℥ss, three times a day. Of the *fluid extract*, the dose is f℥ss. The *compound fluid extract* contains the ingredients of the compound decoction, except the guaiacum—dose, f℥j, three or four times a day.

ARALIA NUDICAULIS—FALSE SARSAPARILLA.

The ROOT of Aralia Nudicaulis, False Sarsaparilla, or Small Spikenard (*Nat. Ord.* Araliaceæ), a small, indigenous, perennial plant, possesses alterative diaphoretic properties similar to those of sarsaparilla, and is employed as a substitute for it, in the same manner and doses.

The ROOT of *A. racemosa* or *American Spikenard*, and the BARK of *A. spinosa*, or *Angelica-tree*, are also employed as alterative diaphoretics.

GUAIACI LIGNUM—GUAIACUM WOOD.

GUAIACI RESINA—GUAIAC.

Guaiacum Wood, or *Lignum Vitæ*, and Guaiac, are products of Guaiacum officinale (*Nat. Ord.* Zygophyllaceæ), a large evergreen tree of South America and the West Indies. The WOOD, which is remarkable for its hardness and density, is imported in logs or billets, covered with a thick gray bark; the outer portion or sapwood is of a pale yellow color, the inner of an olive-brown. It is usually kept in the shops in the state of shavings or raspings; they are inodorous, unless heated, and, when chewed for some time, they have a bitterish, pungent taste. Guaiacum wood yields its virtues to alcohol, and partially to water; they depend on the guaiac contained in the wood.

Guaiac is the CONCRETE JUICE of Guaiacum officinale. It is obtained by spontaneous exudation, or by boring and heating billets of the wood, or by boiling the chips in a solution of salt, and skimming off the matter which rises to the surface. It comes in large, irregular, semi-transparent, brittle pieces, of

varying size—externally, of a deep green or olive color, and internally, red. It has a slight, balsamic odor, which is rendered stronger by heat, and, though at first nearly tasteless, leaves a hot, acrid sensation in the mouth and throat. Water dissolves it partially, alcohol completely. It consists chiefly of a pecular resinoid principle, called *guaiacin* or *guaiacic acid*, which is decomposed by the mineral acids.

Effects and Uses.—Guaiacum wood and guaiac are stimulant diaphoretics, and in large doses cathartic. They are principally used for their alterative virtues in chronic rheumatism, secondary syphilis, and skin diseases; guaiac has been used as a laxative. They are considered also to possess emmenagogue properties, and are employed in amenorrhœa and dysmenorrhœa.

Administration.—*Guaiacum wood* is used only as an ingredient in the compound decoction and syrup of sarsaparilla. Dose of *guaiac*, gr. x to gr. xxx, in pill or emulsion, sometimes combined with alkalies. The *tincture* (six troyounces to alcohol Oij), and *ammoniated tincture* (six troyounces to ar. sp. of ammonia Ojss), are much used in chronic rheumatism; the former is given also in amenorrhœa; dose, f℥j three or four times a day. They are decomposed by water, and should be administered in mucilage, syrup, or milk.

MEZEREUM—MEZEREON.

Mezereon is the BARK of Daphne Mezereum and Daphne Gnidium (*Nat. Ord.* Thymelaceæ), European shrubs, which grow to the height of four or five feet. The root-bark is the part employed in Great Britain, but the bark of our shops, which is brought from Germany, is the STEM-BARK. It comes in strips, from two to four feet long, and an inch or less in breadth, folded in bundles, or wrapped in the shape of balls. It has a thin, grayish, or reddish-brown, wrinkled epidermis, and a tough, pliable, whitish inner bark. When fresh, it has a faint nauseous smell, but, when dry, it is nearly inodorous. Its taste is at first sweetish, afterwards

highly acrid. It yields its virtues to water and alcohol, and contains a peculiar crystalline principle, called *daphnin*, and a *resin*, to which it owes its acridity.

Effects and Uses.—The topical action of mezereon is irritant and vesicant. When swallowed in large quantities, it is highly acrid; in medicinal doses it promotes the action of the secreting and exhaling organs, particularly the skin and kidneys. It is chiefly employed in conjunction with sarsaparilla (in the compound decoction, &c.), as an alterative diaphoretic, in rheumatic, syphilitic, and cutaneous affections. As a *masticatory*, it has been chewed for the relief of paralysis of the muscles of deglutition. The *ointment* (4 troyounces mixed with 14 troyounces of lard melted with 2 troyounces of white wax) is used as a stimulating application to blistered surfaces and indolent ulcers; it is not now officinal.

SASSAFRAS RADICIS CORTEX—BARK OF SASSAFRAS ROOT.

This is the BARK of the ROOT of Sassafras officinale (*Nat. Ord.* Lauraceæ), an indigenous tree of middling size. The bark is found in the shops in small irregular pieces of a cinnamon color, sometimes invested with a brownish epidermis. It has a highly fragrant odor, and a sweetish aromatic taste. Its virtues are extracted by water and alcohol, and reside in a *volatile oil* (*oleum sassafras*). The oil is said to act as a physiological antidote against tobacco.

Effects and Uses.—Sassafras bark is a mild stimulant alterative diaphoretic, used chiefly in combination with sarsaparilla. Its principal virtues are probably aromatic. Dose of the *oil*, two to ten drops. (For *Sassafras Pith*, see *Demulcents.*)

ORDER IV.—DIURETICS.

Diuretics (from *δια*, *thoroughly*, and *ουρεω*, *I make water*), are medicines which excite the secretion of urine. The flow of urine may be promoted *indirectly*, by increasing the quantity

of fluid taken into the stomach, or by the removal of causes which check its secretion, or by mental emotion, a cool temperature, &c. It is promoted *directly* by the use of medicinal agents which specifically affect the kidneys; they are termed diuretics. A large proportion of diuretic medicines are found among the agents which influence other secretions, particularly *diaphoretics*. The functions of transpiration and urination are to some extent vicarious, and the same articles will prove diaphoretic or diuretic, as their action may be directed to the skin or kidneys. External warmth and warm drinks determine the action of such medicines to the skin; and, on the other hand, if the skin be kept cool, and cool diluents freely administered, the secretion from the kidneys is promoted.

Blennorrhetics, or medicines which have a special action on the mucous membranes, exert also a diuretic influence—probably the result of the stimulating impression which they make on the mucous membrane of the urinary passages. When the action of the kidneys is obstructed by disease of the heart, *sedatives* prove diuretic, by their tranquillizing influence on the action of the heart. In cases of obstruction of the portal system, *mercurials* increase the efficacy of the diuretics proper; and also *cathartics*, by stimulating the flow of bile and of the pancreatic juice.

The principal *therapeutic* employment of diuretics is *to promote the absorption of dropsical effusions*. They are also useful, in nephritic disorders attended with obstructed secretion; in stone or gravel, with the view of rendering the urine more dilute; and they may be resorted to as evacuants, to reduce inflammation.

As diuretics act by becoming absorbed, they should be administered in a very diluted state to prevent a cathartic effect.

The following groups of medicines, noticed under other heads, are employed also as diuretics:

1. *The Saline and Ethereal Refrigerants* (see p. 193).

2. *The Alkaline Carbonates* (see *Antacids*); and the *Alkaline Salts, which contain a vegetable acid*, as the acetates, citrates,

and tartrates. The acid tartrate of potassa, or CREAM OF TARTAR (see p. 219), is a very active diuretic.

POTASSÆ ACETAS (*Acetate of Potassa*). This salt, formerly termed *sal diureticus*, from its decided diuretic action, is made by saturating acetic acid with carbonate of potassa. It is white, when pure, of a warm, pungent taste, very deliquescent, and soluble in water and alcohol. In small doses, it is diuretic; in larger doses, gently cathartic. It is a good deal employed as a diuretic in dropsies, as an antacid in acute rheumatism, and has also been found useful as an alterative in cutaneous affections. As is the case with all the alkaline salts containing vegetable acids, the acid of this salt is decomposed in the system into carbonic acid. Dose, ℈j to ʒj, three or four times a day.

3. *Sedatives* (see p. 183), particularly DIGITALIS (see p. 183), which is very much employed in *cardiac* dropsies, in combination with squill.

4. *Blennorrhetics* (see p. 255), particularly the OLEORESINS.

5. Most of the *Stimulating Diaphoretics*.

6. Among *Astringents*, UVA URSI (p. 150), and PIPSISSEWA (p. 151).

SPECIAL DIURETICS.

SCILLA—SQUILL.

Squill is the BULB of Scilla maritima (*Nat. Ord.* Liliaceæ), a perennial plant, which grows on the shores of the Mediterranean. It has fibrous roots, attached to a roundish-ovate bulb, from which both the leaves and flower-stem spring directly, the latter appearing first; the leaves are broad-lanceolate, and from twelve to eighteen inches long; the stem is about two feet high, and bears pale, yellowish-green flowers.

The fresh bulb is pyriform, of the size of the fist to that of a child's head, and consists of thick, fleshy, concentric scales, attenuated at their edges, and attached to a rudimentary stem; the outer scales are very thin and papery. Two kinds of squill bulbs are met with, the *white* and the *red*, which differ only in

the color of their scales, and are identical in medicinal virtues. Both abound in a viscid, acrid juice, which is very much diminished by drying, with little loss of medicinal power. For importation, squill is usually sliced and dried, and is found in the shops in white or yellowish-white pieces, which, when dry, are brittle, but, when moist, flexible. They absorb moisture readily, and should be kept in well-stoppered bottles. They have a feeble odor, a bitter, nauseous, acrid taste, and yield their virtues to water, alcohol, and vinegar. Two active principles have been found in squill: one an acrid, poisonous, resinoid substance, soluble in alcohol and not in ether, the other, a bitter, yellow principle, soluble in water and alcohol; the bitter principle is much less powerful.

Physiological Effects.—In small doses, squill promotes secretion from the mucous membranes and the kidneys—its diuretic effect being much the most marked and constant. In larger doses, it excites nausea, vomiting, and occasionally purging; and, in excessive doses, it acts as an acro-narcotic poison—gr. xxiv having proved fatal.

Medicinal Uses.—Squill is employed principally in the treatment of dropsy; it should not be used, however, in cases complicated with granular disease of the kidneys or inflammation of the bladder. Digitalis is much prescribed in combination with squill in the treatment of cardiac dropsies, and calomel is often added with a view to its action on the absorbents. As a *blennorrhetic expectorant*, squill is an excellent remedy in chronic and subacute bronchial affections; it is, however, improper in inflammatory cases. As an *emetic*, squill is too dangerous for general use; but it forms an ingredient in some emetic preparations administered in croup.

Administration.—Dose, as a *diuretic* or *expectorant*, gr. j, repeated and gradually increased till nausea supervenes. Gr. vj to gr. xij will vomit. Of the *acetum scillæ* (four troyounces to diluted acetic acid Oij), the dose is ℥xxx to f℥ij; of the *syrup*, made by dissolving 24 troyounces of sugar in a pint of *vinegar of squill*, at a gentle heat, f℥j; of the *compound syrup*, known as *hive syrup* (which is prepared by percolation, by first

making a solution of seneka and squill, in diluted alcohol and water, converting it into a syrup, and dissolving in it tartar emetic, one grain of which is contained in every ounce of the syrup), 10 drops to f℥j, according to the age; of the *tincture* (four troyounces to diluted alcohol Oij), 20 to 40 drops. The *compound pills of squill* contain also ginger, ammoniac, and soap, and are used as a stimulant expectorant; dose, one pill three or four times a day, each pill containing half a grain of squill and one grain of ammoniac.

COLCHICUM.

Colchici Radix, Colchicum Root; Colchici Semen, Colchicum Seed.

Colchicum autumnale, or Meadow-Saffron (*Nat. Ord.* Melanthaceæ), is a small, biennial, bulbous plant, which grows wild, in moist meadows, in England and other temperate parts of Europe. The bulb, or corm, as it is botanically termed, appears in midsummer as the lateral offset from the corm of the preceding year, and sends up the flower-stem in the autumn—the leaves and fruit following in the succeeding spring. The leaves are broadly lanceolate, about five inches long; the flowers of a lilac or light-purple color; and the fruit oblong, elliptical, and three-celled.

The CORMS and SEEDS are the portions used medicinally. The corms are gathered in July, just before the sprouting of the flower from the young corm. They are somewhat like tulip bulbs in appearance, but solid and not composed of scales. They are covered by an external brown membrane, and an inner reddish-yellow one. Internally, they are white, fleshy, and solid, and contain an acrid, bitter, milky juice. As found in the shops, they are in the dried state, sometimes whole, but usually cut into transverse slices about an eighth of an inch thick, with a notch on one side, and deprived of the outer brown membrane. They have a hircine odor, and a bitter, hot, and acrid taste. The seeds are brown, about the size of black mustard-seeds, inodorous, and have a bitter, acrid

taste; they are less apt to be injured by drying than the corms.

Colchicum corms and seeds yield their virtues to vinegar and alcohol; they both contain a peculiar non-crystallizable alkaloid active principle, soluble in water and alcohol, but insoluble in ether, termed *colchicia*, ($C_{34}H_{19}NO_{10}$), which is a powerful poison.

Physiological Effects.—Colchicum is a local irritant. Taken internally, in small doses, it stimulates the secretions generally; in larger doses, it produces nausea, vomiting, and purging, and commonly a reduction of the frequency of the pulse; in excessive doses, it is an acro-narcotic poison, producing death by a sedative action on the heart. Although placed among the diuretics, colchicum does not evince a more decided action on the kidneys than on other secretions, as those of the skin, liver, and mucous membranes.

Medicinal Uses.—Colchicum has long enjoyed a high reputation in the treatment of gout; and, although its *modus medendi* is rather obscure, it is universally admitted to possess a more decided control over the disease than any other remedy. Its efficacy has been attributed to a combined sedative, anodyne, and eccritic action; but, besides this, an influence on the blood probably contributes to its anti-arthritic effect. It is usually administered in repeated doses, till an effect is produced on the bowels; Epsom salt and magnesia are often combined with it, as in the celebrated *Scudamore's draught* (*magnesia*, gr. xv to xx; *sulphate of magnesia*, ℥j to ℥ij; *vinegar of colchicum*, f℥j to f℥ij, in any pleasant vehicle). An excellent combination, in the treatment of gout, is colchicum (*wine of the seed*, f℥i), with iodide of potassium (℥ij), dissolved in cinnamon water (f℥viij),—dose, f℥ss, three times a day, until purgation is produced. When it is desired to act on the kidneys and skin rather than the bowels, opiates are sometimes given with colchicum. In rheumatism, it is also employed, but with less marked success than in gout. It has been occasionally resorted to as a diuretic in dropsy, as a sedative in febrile and inflammatory diseases, as an anthelmintic, as an expectorant, and in some nervous affections.

Administration.—Dose of the corm or seeds, in *powder*, gr. ij to gr. viij; the seeds are preferred. The liquid preparations, which are more generally used than the powder, are: The *vinegar* (*acetum*) (two troyounces of the root to diluted acetic acid Oij), dose, 30 drops to f℥ij; *wine of the root* (twelve troyounces to sherry wine Oij), dose, ♏x to f℥j; *wine of the seed* (four troyounces to wine Oij), dose, f℥i–ij; *tincture* (four troyounces *of the seed* to diluted alcohol Oij), dose, f℥ss to f℥ij. An *acetic extract of the root* is also employed—dose, gr. i–ij; and a *fluid extract of the seed*, and also *the root*—doses, 4 to 12 drops.

ERIGERON—FLEABANE.

Three varieties of *Erigeron* are officinal: E. Canadense, or Canada Fleabane, E. heterophyllum, or Various-leaved Fleabane, and E. Philadelphicum, or Philadelphia Fleabane (*Nat. Ord.* Asteraceæ). They are herbaceous indigenous plants, two or three feet high, with ovate or lanceolate toothed leaves, and white, blue or purple flowers. The whole HERB is officinal. *Canada Fleabane* has an agreeable odor, and a bitter, acrid, somewhat astringent taste. It contains bitter extractive, tannic and gallic acids, and volatile oil; and is diuretic, tonic, and astringent. The *oil of Canada Fleabane* possesses hæmostatic properties, and has been used in hemorrhagic dysentery and uterine hemorrhage—dose, 5 to 10 drops. *Various-leaved* and *Philadelphia Fleabane*, popularly known as *scabious*, have an aromatic odor, and a slightly bitterish taste. Their most striking medicinal action is diuretic, and they have long been favorite remedies in dropsical and nephritic affections. An *infusion* or *decoction*, to the amount of a pint (containing a troyounce of the herb), may be taken daily.

APOCYNUM CANNABINUM—INDIAN HEMP.

This is an indigenous herbaceous plant (*Nat. Ord.* Apocynaceæ), growing to the height of two or three feet, with oblong-

ovate leaves, and small, greenish, campanulate flowers. The ROOT is the officinal portion; it is of a yellowish-brown color when young, and of a dark-chestnut when old, has a strong

Fig. 22.

odor, and a nauseous acrid, bitter taste. The fresh root, when wounded, pours out a milky juice: it yields its virtues to water and alcohol, and contains tannic and gallic acids, gum, resin, a bitter principle, &c., and a peculiar active principle termed *apocynin*.

Effects and Uses.—Indian hemp (which is not to be confounded with Cannabis Indica, p. 68), is an emeto-cathartic, diuretic, diaphoretic, and sedative. It is chiefly employed in the treatment of dropsy, in the form of *decoction* (half a troy-

ounce to water Ojss, boiled to Oj), of which f℥i–ij may be taken two or three times a day.

TARAXACUM—DANDELION.

Taraxacum Dens-leonis, or Dandelion (*Nat. Ord.* Cichoraceæ), is a small herbaceous, perennial plant, common to most parts of the world, and found abundantly throughout the United States. It has a fusiform root, which sends up numerous long, sinuated, bright-green leaves, and flower-stems, about six inches high, bearing golden-yellow flowers. The ROOT is the officinal portion, and *should be gathered in the autumn.* In the fresh

Fig. 23.

state, it is several inches long, branched, fleshy, of a light-brown color externally, whitish within, and abounds in a milky juice; the *fresh* root is preferable for use. When dried, it is shrunken, wrinkled, and brittle. It is without smell, but has a bitter taste. Boiling water extracts its virtues, which depend on a peculiar bitter crystallizable principle, termed *taraxacin*, soluble in boiling water, alcohol, and ether.

Effects and Uses.—Taraxacum is diuretic and slightly aperient, with some tonic action, and a special determination to the liver. It is a valuable remedy in hepatic dropsies, and is also employed in dyspepsia, accompanied by derangement of the liver. It is given in the form of *infusion* (two troyounces to

boiling water Oj),—dose f℥ij, three times a day; *extract* (an inspissated juice, which should not be kept above a year),—dose ℈j to ℥j three times a day; and *fluid extract*,—dose, f℥i–ij, three times a day.

JUNIPERUS—JUNIPER.

The FRUIT, or berries, of Juniperus communis (*Nat. Ord.* Pinaceæ), an evergreen European shrub, naturalized in the United States, are used as adjuvants to the more active diuretics. When dried, they are about the size of a pea, and of a blackish-purple color; they are given in *infusion* (a troyounce to boiling water Oj). Their virtues depend on a *volatile oil* (OLEUM JUNIPERI), the dose of which is five to fifteen drops, two or three times a day. The *compound spirit of Juniper* (a fluidrachm and a half of the oil, with 10 minims each of the oils of caraway and fennel, dissolved in 8 pints of diluted alcohol), is a pleasant addition to stimulating diuretic infusions,—dose, f℥i–ij.

CAROTA—CARROT SEED.

Daucus Carota, or Wild Carrot (*Nat. Ord.* Apiaceæ), is a very common indigenous plant, which is found also wild in Europe. It has a biennial spindle-shaped root, an erect branching stem two or three feet high, tripinnate leaves with narrow, pointed leaflets, and small white flowers, arranged in umbels. The FRUIT or SEEDS, which are the officinal portion, are light, of a brownish color, an oval shape, convex and bristly on one side, and flat on the other. They have an aromatic odor, a warm, pungent, bitterish taste, and contain a volatile oil, on which their virtues depend.

Effects and Uses.—Carrot-seeds are aromatic and diuretic, and are a good deal employed in dropsical and nephritic affections, agreeing well with the stomach, from their aromatic oil. The infusion is a popular remedy for the relief of strangury

from blisters. Dose, ʒss to ʒj, or an *infusion* (half a troyounce to water Oj), *ad libitum*.

The ROOT of this plant possesses the same properties as the seeds. The ROOT of the cultivated plant, the well-known garden carrot, is employed as an application to sloughing ulcers.

CANTHARIS—SPANISH FLIES.

The properties, &c., of *cantharides* will be noted fully under the head of *Irritants* (subdivision *Epispastics*). Taken internally, they sometimes prove diuretic, and generally excite irritation of the genito-urinary passages, as strangury, priapism, &c.; and in overdoses, act as an acro-narcotic poison. They are employed in atonic dropsies, incontinence of urine, amenorrhœa, seminal weakness, impotence, &c. Dose, gr. i–ij, twice a day, in pill. They are most commonly administered in *tincture* (a troyounce to diluted alcohol Oij),—dose, gtt. x, or more, three or four times a day, till strangury supervenes.

The following medicines, though less frequently resorted to than the foregoing, possess very decided diuretic properties, and may be employed with advantage in the treatment of dropsical and nephritic affections:

The ROOT of HYDRASTIS CANADENSIS, or YELLOW ROOT (*Nat. Ord.* Ranunculaceæ), a small indigenous plant, which contains the alkaloid *berberina* (previously noticed), and another alkaloid *hydrastia*, is a very efficacious diuretic in promoting the discharge of calculi from the kidneys.

The ROOT of DELPHINIUM CONSOLIDA, or LARKSPUR (*Nat. Ord.* Ranunculaceæ), a European plant, cultivated in our gardens, and to some extent naturalized.

The FRESH TOPS (and also the *seeds*) of CYTISUS SCOPARIUS or BROOM, (*Nat. Ord.* Fabaceæ), a European shrub, cultivated in our gardens.

The ROOT of PETROSELINUM SATIVUM, or PARSLEY (*Nat. Ord.* Apiaceæ), a European plant, cultivated in our vegetable

gardens, for its leaves. Parsley contains a peculiar principle, termed *apiol*, a yellowish oily liquid, which has been used in amenorrhœa and dysmenorrhœa, in the dose of four grains, morning and evening.

The ROOT of COCHLEARIA ARMORACIA, or HORSE-RADISH (*Nat. Ord.* Brassicaceæ,) a European plant, cultivated here for its root, which is used as a condiment.

ORDER V.—BLENNORRHETICS.

Blennorrhetics (from *βλεννα*, *mucus*, and *ρεω*, *I flow*), are medicines which promote the secretion of the mucous membranes. They are employed therapeutically in morbid conditions of these membranes, with a view to the restoration of healthy action, in cases of deficient, abnormal, or excessive secretion.

When administered with the object of stimulating the secretion of mucus from the bronchial or laryngeal membrane, this class of agents is termed *expectorants*. They are prescribed in the subacute and chronic forms of bronchitis and laryngitis, and in the declining stages of the acute forms of these affections and pneumonia. In the early or inflammatory stages of acute bronchitis and laryngitis, the stimulating expectorants are inadmissible, until nauseants and depletion have been resorted to.

The blennorrhetics are less employed in gastro-enteric affections than in those of other mucous membranes, owing to their tendency to produce catharsis. Several of the oleoresins are, however, used with advantage in certain forms of chronic diarrhœa, and the oil of turpentine is highly esteemed in the treatment of the diarrhœa of typhoid fever.

The oleoresinous articles of this group are extensively employed in diseases of the urino-genital mucous membranes,—gonorrhœa, gleet, leucorrhœa, incontinence of urine, cystitis, &c.

The following are the articles chiefly resorted to for their influence on the mucous membranes:

SENEGA—SENEKA.

Polygala Senega, or Seneka Snakeroot (*Nat. Ord.* Polygalaceæ), is a small indigenous plant, found in all parts of the United States, but most abundantly in the South and West.

Fig. 24.

It has a perennial, branching root, several erect annual stems, about a foot in height, alternate lanceolate leaves, and small, whitish flowers, arranged in a terminal spike. The ROOT is the officinal portion. It occurs in the shops in twisted pieces, varying in thickness from the size of a quill to that of the little finger, attached to a knotty head, and marked with a ridge along their whole length, and numerous annular protuberances. The cortical portion is hard, resinous, of a yellowish-brown color, and *contains the active qualities of the root.* The central ligneous portion is white and inert. The odor of seneka is peculiar and disagreeable, but faint in the dried root; the taste is at first mucilaginous and sweetish, but afterwards becomes acrid and very irritating.

The virtues of seneka are extracted by cold and hot water and alcohol. It contains a peculiar acrid acid principle called *polygalic acid*, on which its activity chiefly depends.

Effects and Uses.—Seneka, in small doses, is an active excitant of the mucous membranes and secretions generally, and in large doses proves emetic and cathartic. It is chiefly prescribed as a stimulating expectorant in chronic and subacute bronchial affections, and in the latter stages of acute bronchitis, pneumonia, &c. As an ingredient in the *compound syrup of squill*, it is much employed in the treatment of croup, but, except in some such combination with tartar emetic or other emetic nauseant, it is scarcely admissible in the early stages of this disease. Seneka is also thought to possess emmenagogue properties, and is highly extolled by many practitioners in the treatment of amenorrhœa. It has been occasionally used as a diuretic in dropsies, and, in emeto-cathartic doses, has been found useful in rheumatism.

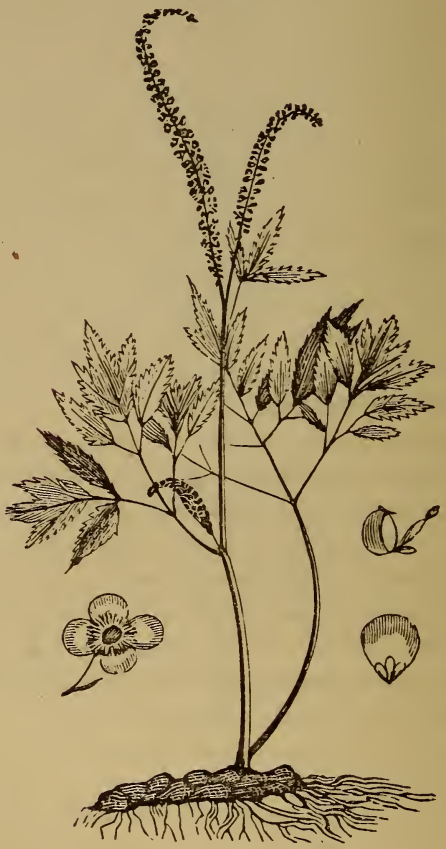
Administration.—Dose, in *powder*, gr. x. to ℈j; but it is chiefly given in *decoction* (a troyounce boiled for fifteen minutes in water enough to make the decoction measure Oj), dose, f℥ij, three or four times a day. An *alcoholic extract* is given in the dose of from one to three grains; and a *syrup* is also used, in the dose of f℥i–ij (made by percolating four troyounces of seneka with two pints of diluted alcohol, evaporating to half a pint, and dissolving in this tincture fifteen troyounces of sugar by a gentle heat).

CIMICIFUGA—BLACK SNAKEROOT.

Cimicifuga racemosa, Black Snakeroot, or Cohosh (*Nat. Ord.* Ranunculaceæ), is a very common indigenous perennial plant, growing to the height of from four to eight feet, with ternate leaves, oblong-ovate, incised, and toothed leaflets, and small, white flowers disposed in a long raceme. The ROOT is the part employed. It consists of a rugged, blackish-brown caudex, from a third of an inch to an inch in thickness, often several

inches in length, furnished with numerous slender radicles. Internally, its color is whitish; it has a peculiar, faint, disagreeable odor, and a bitter, somewhat astringent taste. It im-

Fig. 25.



parts its virtues to boiling water, and contains gum, starch, resin, tannic and gallic acids, salts, and a portion of volatile oil.

Effects and Uses.—The effects of cimicifuga are not very accurately known, but it is undoubtedly an active stimulant of the secretions, particularly those of the mucous membranes, skin, and kidneys, with, probably, in large doses, a sedative

and antispasmodic action on the nervous system. It has been employed with great advantage as an expectorant in chronic bronchial affections, and even phthisis pulmonalis, and has been also used as a diaphoretic in rheumatism, and as a diuretic in dropsies. As an antispasmodic in chorea, it enjoys a high reputation, and it is also recommended in the spasmodic forms of hysteria, particularly when connected with amenorrhœa. A saturated alcoholic solution has been used, with good effect, as an application to the eyelids in ophthalmia.

Administration.—Dose, in *powder*, ℈j to ʒj; a *decoction* and *acetous tincture* (though not officinal) are employed. Of the *fluid extract*, the dose is fʒss–j.

ALLIUM—GARLIC.

Allium sativum (*Nat. Ord.* Liliaceæ), is a small, perennial, bulbous plant, which grows wild in the south of Europe, and is cultivated in all parts of the world. The BULB is the portion used. As found in the shops, it is somewhat spherical in form, about an inch in diameter, with a portion of the stem attached, covered with a white, membranous envelope, and consists of five or six smaller bulbs, of a curved, oblong shape, called *cloves* of garlic. They have a strong, irritating, characteristic odor, and a bitter, acrid taste. Water, alcohol, and vinegar extract their virtues, which depend on an *essential oil*, which is of a yellow color, very volatile and irritating; it is a sulphuret of a peculiar radical, termed *allyl* (C_6H_5).

Effects and Uses.—Garlic is a local irritant and rubefacient, and, taken internally, quickens the circulation and stimulates the secretions generally. It is a good deal employed as an expectorant in chronic and subacute catarrhal affections, particularly in infantile cases, and, occasionally, as a stomachic in flatulence, and as a diuretic in atonic dropsies. *Externally*, it is used as a revulsive rubefacient to the feet, as a resolvent of indolent tumors, and as a liniment in infantile convulsions.

Administration.—A clove may be swallowed entire, or cut

into small pieces. Dose of the *fresh bulbs*, ʒi–ij, in pill; of the *juice*, fʒss, mixed with sugar; of the *syrup* (made by macerating 6 troyounces of garlic in 10 fluidounces of diluted acetic acid, expressing, mixing the residue with 6 fluidounces more of diluted acetic acid, expressing, and dissolving in the expressed liquid 24 troyounces of sugar), fʒj, for children.

SCILLA—SQUILL.

Squill, already noticed among diuretics, is one of the most powerful and valuable stimulating expectorants in the Materia Medica. (For properties, doses, preparations, &c., see p. 246).

TEREBINTHINA—TURPENTINE.

The term *turpentine* is applied to liquid or concrete vegetable juices, consisting of resin combined with a peculiar essential oil, called *oil of turpentine*. Two kinds of turpentine are recognized by the U. S. Pharmacopœia: 1. The *common American white turpentine*, which is procured chiefly from Pinus palustris (*Nat. Ord.* Pinaceæ), a large indigenous evergreen tree of our Southern States, where it is called *Long-leaved Pine*, *Yellow Pine*, and *Pitch Pine*, and in part also from Pinus Tæda, found in Virginia, and other species of Pinus. 2. *Canada turpentine*, kept in the shops, under the name of *Canada balsam* or *balsam of fir*, the product of Abies balsamea, the American Silver Fir, or Balm of Gilead Tree (*Nat. Ord.* Pinaceæ), a handsome tree about 40 feet in height, inhabiting the northern portions of North America. Many other varieties of turpentine are known in commerce, as *Bordeaux turpentine*, *Venice turpentine*, *Chian turpentine*, &c.

White turpentine comes from North Carolina and other Southern States, and is collected from excavations made in the trunks of trees, into which the turpentine runs in the mild weather. It is yellowish-white, and somewhat translucent, semi-fluid in summer, firm and hard in winter, but becoming

permanently hard by exposure to the air, and has a peculiar aromatic odor, and a warm, pungent, bitterish taste. *Canada turpentine* comes from Canada and Maine. It is procured by breaking the vesicles, which are found between the bark and wood of the trees, and collecting the liquid contents in a bottle. When fresh, it has the consistence of honey, but gradually solidifies by age. It is yellow, transparent, tenacious, of a peculiar, pleasant terebinthinate odor, and a slightly bitter, acrid taste.

Chemical Constituents.—The turpentines yield, by distillation, a *volatile oil*, known as oil of turpentine, and leave a residue consisting exclusively of *resin*. Both the *oil* and *resin* are officinal. The turpentines are inflammable, nearly insoluble in water, but almost wholly soluble in alcohol and ether.

Physiological Effects.—The local operation of the terebinthinates is irritant. When applied to the skin, they produce a rubefacient effect, and when swallowed, *in large doses*, promote the peristalic motion of the intestines. Taken internally, in small doses, they are absorbed, and prove excitant to the vascular system and the secretions generally, especially the mucous membranes; they communicate a violet odor to the urine. The activity of the terebinthinates depends on their *volatile oil.*

Medicinal Uses.—Turpentine is employed chiefly in diseases of the various mucous membranes, as gonorrhœa, gleet, leucorrhœa, cystorrhœa, chronic bronchitis, and chronic mucous diarrhœa. It is also used in rheumatic complaints; and, in cathartic doses, in cases of ascarides, constipation, and colic.

Administration.—Dose, as a *blennorrhetic*, ℈j to ʒj, in *pill*, *emulsion*, or *electuary;* as an *anthelmintic* or *cathartic*, half a troyounce to an ounce, in emulsion. The *white turpentine* is generally used in this country.

Oleum Terebinthinæ (*Oil of Turpentine*), ($C_{20}H_{16}$) commonly called *Spirit of Turpentine*, is the active principle of turpentine, obtained by distillation. It has already been noticed under the head of aromatic stimulants (p. 175). Its

effects and medicinal uses are the same as those of turpentine, for which it is usually substituted in practice. Locally, it acts as a rubefacient. When swallowed in large doses, as f℥i–ij, it commonly passes off by the bowels; and, taken in small doses, it is absorbed, and stimulates the circulation and the secretions of the mucous membranes, kidneys, and skin. It often produces strangury and considerable irritation of the urino-genital passages. In large doses, it is employed as an anthelmintic and cathartic, and is much used as a clyster for the relief of tympanites. In *small doses*, it is greatly prescribed in chronic discharges from the various mucous membranes; in the latter stages of typhoid fever as a combined stimulant and blenorrhetic; as a diaphoretic in rheumatism and neuralgia; in infantile diabetes, nephritic disorders, dropsy, &c. As a *rubefacient*, it is a valuable counter-irritant in numerous diseases.

Dose, gtt. v–xxx, repeated, as a *blenorrhetic stimulant;* f℥ss –f℥j, as a *cathartic enema*, or *anthelmintic*, in emulsion. *Linimentum terebinthinæ* (oil of turpentine Oss, melted with resin cerate twelve troyounces), is used as an application to burns and scalds.

Pix Liquida (*Tar*), is an impure turpentine, procured by burning, from the wood of Pinus palustris, and other species of Pinus. It is a brownish-black, viscid, semi-liquid substance, of a peculiar empyreumatic odor, and a bitterish, resinous, somewhat acid taste—soluble in alcohol, ether, and the volatile and fixed oils. It consists of resin, united with acetic acid, oil of turpentine, and various volatile, empyreumatic products. By distillation, it yields *pyroligneous acid* and *oil of tar*—the residuum being pitch.

The *oil of tar* contains, besides oil of turpentine, *creasote* (see p. 154), and other principles.

Effects and Uses.—Tar resembles the turpentines in its effects, and is employed in chronic catarrhal affections and other diseases of the mucous membranes. Its vapor has been employed in bronchitis; and externally, it is an excellent

application in tinea capitis, psoriasis, and other cutaneous affections. Dose, ʒss to ʒj, several times a day, in pill or electuary; or *tar water—aqua picis liquidæ*—(made by digesting tar Oj with water Oiv), may be taken in the quantity of Oi–ij, daily. The *ointment* (*unguentum picis liquidæ*), is made by mixing equal parts of tar and melted suet.

Resina (*Resin*), commonly called *rosin*, is the residuum after the distillation of the oil from white turpentine. It is a yellowish-brown, semi-transparent, solid, brittle substance, with a slight terebinthinate odor and taste—insoluble in water, soluble in ether, alcohol, and the essential oils, readily uniting by fusion with wax and the fixed oils, and forming soluble soaps with alkalies. When agitated with water, in a state of fusion, it becomes opaque and *white*. It is not used *internally*, but is extensively employed in the formation of *plasters* and *ointments*, to which it communicates great adhesiveness and slightly stimulant properties.

Ceratum Resinæ (*Resin Cerate*), commonly called *basilicon ointment*, is made by melting resin (5 parts), lard (8 parts), and yellow wax (2 parts), together: it is an excellent mild stimulant application to burns, blistered surfaces, &c. *Compound Resin Cerate*, made by melting 12 troyounces of resin, suet, and yellow wax, each, with 6 troyounces of turpentine, and 7 troyounces of flaxseed oil, is a good stimulant cerate, very popular under the name of *Deshler's Salve*. *Emplastrum Resinæ* (*Resin Plaster*), made by melting one part of resin with six parts of lead plaster, is the well-known *adhesive plaster*, used for retaining the edges of wounds in contact, &c.

COPAIBA.

Copaiba is the juice of several species of Copaifera (*Nat. Ord.* Amyridaceæ), large trees peculiar to South America. C. officinalis has been thought to be a principal source of copaiba, but it yields little of that now in use, and most of the

copaiba of commerce is probably derived from C. multijuga, which grows in the province of Para, in Brazil. The juice is obtained from incisions in the stems of the trees: as it first exudes, it is clear, colorless, and very thin, but it soon acquires a thicker consistence, and a yellowish hue. As found in the shops, it is a clear, transparent liquid, of the consistence of olive oil, of a pale-yellow color, a peculiar agreeable smell, and a pungent, nauseous, acrid taste. By exposure to the air it acquires a deeper color and denser consistence. Copaiba is imported both from Brazil and Central America.

Copaiba is insoluble in water, but soluble in alcohol, ether, and the volatile and fixed oils; with alkalies and alkaline earths, it forms a soap. It is, chemically, an *oleo-resin*, with a minute portion of acetic acid; the VOLATILE OIL is officinal; the *resin* possesses acid properties, and is called *copaivic acid*. By exposure to the air, copaiba gradually becomes darker and thicker, and finally hard and brittle, owing to the volatilization and oxidation of its oil. Copaiba was formerly called a *balsam*, but this title is incorrect, as it contains no *benzoic* or *cinnamic acid*.

Effects and Uses.—The effects of copaiba are very analogous to those of the terebinthinates. In large doses, it proves cathartic, and occasionally emetic, and, in small doses, it is absorbed, communicating its peculiar odor to the secretions and exhalations, and stimulating the secretions from the mucous membranes and kidneys; it is also a gentle excitant to the circulatory system. It is employed in diseases of the mucous membranes, particularly those of a chronic character, as chronic bronchitis, chronic diarrhœa, leucorrhœa, gonorrhœa, gleet, catarrh, and irritation of the bladder, &c. As a remedy in gonorrhœa, it has long enjoyed great popularity, and is given with advantage even in the earliest stages of the disorder.

Administration.—Dose, gtt. xx to f℥j, three times a day, in *emulsion*, with some aromatic water, or in pills (*pills of copaiba*), made by mixing 2 troyounces of copaiba with 60 grains of magnesia, and dividing the mass after it concretes into 200 pills, or inclosed in *capsules* of gelatin. It is also administered as a

clyster, in *emulsion*. Cubeb is frequently prescribed with copaiba, in the treatment of gonorrhœa.

Oleum Copaibæ (*Oil of Copaiba*), ($C_{20}H_{16}$), obtained by distillation from copaiba, is usually colorless, with the odor and taste of copaiba, and produces the same effects on the system. Dose, gtt. x–xv, in *emulsion*, or dropped on sugar.

CUBEBA—CUBEB.

Cubeb is the berries of Piper Cubeba (*Nat. Ord.* Piperaceæ), a climbing, perennial plant of Java and other parts of the East Indies. The berries are gathered for use when unripe, and are dried. They are about the size of a small pea, of a blackish or grayish-brown color, a reticulated surface, and furnished with a stalk two or three inches long. The shell is hard, and contains a blackish seed, which is white and oily within. The odor of cubeb is aromatic; the taste warm, acrid, and camphoraceous. The berries deteriorate by age, most rapidly in powder, owing to the escape of their volatile oil. Their most important constituents are a volatile oil (which is officinal), $C_{15}H_{12}$, a principle called *cubebin*, and *resinous* matter. The *oil* is carminative and stimulant, and the blennorrhetic and diuretic properties of cubeb reside chiefly in the *resin;* cubebin is inert.

Effects and Uses.—In large doses, cubeb, like the other oleoresins, produces more or less gastro-enteric disturbance. In small doses, it is absorbed, and acts as a gentle excitant to the vascular system, with a very decided stimulant action on the mucous surfaces, particularly those of the urino-genital apparatus; it also frequently proves diuretic. It is chiefly used in the treatment of gonorrhœa, and should be given in the early stage of the disease. In other mucous discharges, as chronic catarrh with profuse secretion, leucorrhœa, gleet, cystitis, &c., cubeb has also been employed with advantage.

Administration.—Dose of the *powder*, ʒi–iij, three times a day, in gonorrhœa; in chronic mucous disorders, smaller doses are given. The oil is often employed, but it does not possess the full virtues of cubeb—dose, gtt. x–xij, to be repeated and

gradually increased; it may be taken in emulsion, or dropped on sugar, or made into gelatinous capsules with oil of copaiba. The *oleoresin* contains both the volatile oil and resin, with a portion of cubebin, and is an excellent preparation—dose, ℿv–xxx, suspended in water; of the *tincture* (four troyounces to diluted alcohol Oij), the dose is f℥i–ij, three times a day. *Troches of cubeb* are made with a fluidounce of the oleoresin, a fluidrachm of oil of sassafras, 3 troyounces each of sugar and gum Arabic, mixed with enough syrup of Tolu to form a mass, and divided into troches, each weighing ten grains.

MATICO.

This name is given to the LEAVES of Artanthe elongata (*Nat. Ord.* Piperaceæ), a shrub of Peru. They are two or three inches long, by about an inch in breadth, oval-lanceolate and acuminate in shape, crenate, reticulate, bright-green on the upper surface, paler beneath, of a pleasant, aromatic odor, and a strong, spicy taste. They contain chlorophyll, resin, volatile oil, and a peculiar bitter principle, soluble in water and alcohol, termed *maticin*.

Effects and Uses.—Matico is a pleasant aromatic tonic, with a special determination to the mucous membranes. It is used as an alterative stimulant in the entire circle of diseased mucous membranes, especially those of the urinary passages. It is also used internally as a hemostatic, and locally as a styptic. Dose, of the *powder*, ℥ss–j, three times a day. An *infusion* (not officinal) may be made by dissolving a troyounce in a pint of boiling water—dose, a wineglassful.

PAREIRA—PAREIRA BRAVA.

Pareira Brava is stated by the U. S. Pharmacopœia to be the ROOT of Cissampelos Pareira (*Nat. Ord.* Menispermaceæ), a climbing plant of the West Indies and South America. But the origin of the Pareira Brava of the shops is still uncertain.

It comes to us in wrinkled, twisted, or forked, cylindrical pieces, of variable thickness and length, covered with a thin, grayish-brown bark. The interior is ligneous, yellowish, porous, inodorous, and of a sweetish, nauseous, bitter taste. It imparts its virtues to water, and contains a bitter alkaline principle, termed *cissampelina*, resin, fecula, &c.

Effects and Uses.—Pareira Brava is an excellent remedy in chronic diseases of the urinary passages, particularly chronic inflammation or irritation of the bladder, with morbid secretion. It is said to be also tonic, aperient, and diuretic. Dose, in substance, ℥ss to ℥j. But it is more conveniently given in *infusion* (a troyounce to boiling water Oj), dose, f℥i–ij. A *fluid extract*, although not officinal, is much used—dose from half a fluidrachm to a fluidrachm.

BUCHU.

This is the name given to the LEAVES of Barosma crenata and other species of Barosma (*Nat. Ord.* Rutaceæ), shrubby plants, growing at the Cape of Good Hope. As found in the shops, buchu leaves are from three-quarters of an inch to an inch and a half long, from three to five lines broad, elliptical, lanceolate-ovate, or obovate, sometimes pointed, sometimes blunt, notched and glandular at the edges, and of a green color, paler on the under surface. Three varieties are known, viz.: *short* or *round* buchu (derived from B. crenata), *medium sized* (from B. crenulata), and *long* buchu (from B. serratifolia). They have a strong, aromatic odor, and a bitterish taste, like that of mint. Water and alcohol extract their virtues, which depend on a *volatile oil* and *extractive*.

Effects and Uses.—Buchu is a gentle stimulant to the secretions generally, particularly to the kidneys and urinary mucous membranes; it may be made to act also as a diaphoretic. It is employed in chronic catarrh of the urethra and bladder, nephritic complaints, retention or incontinence of urine—as a diuretic, in dropsies—and as a diaphoretic in rheumatic and cutaneous complaints. Dose, of the *powder*, gr. xx–xxx; of

the *infusion* (a troyounce to boiling water Oj), f℥i–ij. A *fluid extract* is officinal—dose, f℥ss.

MYRRHA—MYRRH.

Myrrh is the CONCRETE JUICE of Balsamodendron Myrrha (*Nat. Ord.* Amyridaceæ), a small tree of Arabia Felix and Africa; the juice exudes spontaneously and concretes upon the bark. It is imported from the East Indies, and occurs in small, semi-transparent, reddish-yellow fragments or tears—sometimes agglutinated together in larger masses—of irregular shape and size, an agreeable, peculiar odor, and a bitter, aromatic taste. It is brittle and pulverizable, has a resinous fracture, and makes a light-yellowish powder. Inferior kinds of myrrh are darker and less translucent and odorous. Myrrh is a gum-resin, containing also a little volatile oil. It forms with water an emulsion, and is soluble in alcohol and ether.

Effects and Uses.—Myrrh is a stimulant expectorant and emmenagogue, with some tonic effects. It is prescribed in chronic catarrhal and asthmatic affections, in which a combined corroborant and expectorant effect is desirable; and also in chlororis, amenorrhœa, &c. Chalybeates and aloes are frequently united with it in uterine affections. Locally, it is a good application to spongy gums, aphthous sore mouth, &c.

Administration.—Dose, gr. x to ℥ss, in powder or pill, or suspended in water, as in *Mistura Ferri Composita* (see p. 126). The *tincture* (three troyounces to alcohol Oij), is chiefly employed externally—dose, internally, f℥ss to f℥j. *Pills of Aloes and Myrrh*, *Compound Galbanum Pills*, and *Compound Iron Pills*, are officinal emmenagogue preparations of myrrh.

BENZOINUM—BENZOIN.

Benzoin is the CONCRETE JUICE of Styrax Benzoin, or Benjamin Tree (*Nat. Ord.* Styraceæ), a tall tree of Sumatra, Java, Borneo, and Siam. It is obtained by incisions in the bark, from which it readily exudes, afterwards hardening by ex-

posure to the sun and air. Two kinds are known, the more valuable consisting chiefly of whitish *tears*, united by a reddish-brown connecting medium, and called *benzöe amygdaloides*, the other of brown or blackish *lumps*, without tears, known as *benzöe in sortis* (*benzoin in sorts*). Benzoin is volatile, has a fragrant odor, a feeble, slightly aromatic taste, is soluble in alcohol and ether, and is precipitated from its alcoholic solution by water. Its chief constituents are *resin* and BENZOIC ACID, which places it among the BALSAMS; it contains also a trace of extractive and of volatile oil; and sometimes cinnamic acid.

Effects and Uses.—Benzoin is a topical irritant, and, after absorption, stimulates the mucous passages, especially the aërian membranes. It resembles myrrh in its effects, but is more acrid and stimulating, and less tonic. It is adapted to chronic bronchial affections, but is seldom employed alone. As a fumigation in chronic laryngitis, it has been recommended by Trousseau and Pidoux. Dose, gr. x to ʒss. The *compound tincture* (containing benzoin 3 troyounces, aloes half a troyounce, storax 2 troyounces, balsam of Tolu a troyounce, dissolved in alcohol 2 pints), is used as a stimulating expectorant and in bowel complaints—dose, fʒss to fʒij. *Ointment of benzoin* is made by heating together one part of benzoin and sixteen parts of lard. As benzoin has the property of obviating the rancidity to which lard is liable, this is a very useful vehicle for medicated ointments.

ACIDUM BENZOICUM (*Benzoic Acid*), is obtained from benzoin by sublimation, or by the action of alkalies. It occurs in white, soft, feathery crystals, of a silky lustre, and not pulverulent. It has more or less of the odor of the balsam, a warm, acrid, and acidulous taste, is inflammable, sparingly soluble in cold water, rather soluble in boiling water, but perfectly soluble in alcohol, alkaline solutions, and fixed oils. It is a constituent of *the balsams*.

Effects and Uses.—Benzoic acid is a local irritant, acting on the general system as a stimulant, with a particular direction to the mucous surfaces, especially the aërian. Dose, gr. x.

In its passage through the system, it abstracts nitrogen from the elements of urea, and passes out with the urine in the form of hippuric acid. It is little employed in medicine, except as an ingredient in *Paregoric Elixir*.

BALSAMUM PERUVIANUM—BALSAM OF PERU.

Balsam of Peru is the JUICE of Myrospermum Peruiferum (*Nat. Ord.* Leguminosæ), a tree of Central America. It is obtained from incisions in the bark, and is collected on rags inserted in the openings, which are afterwards boiled in water, when the balsam settles at the bottom, and the water is poured off. A *white* balsam, obtained from the fruit of this tree by expression, and a tincture of the fruit in rum, are also known in Central America. Balsam of Peru has the consistence of honey, a dark, reddish-brown color, a pleasant smell, a warm, acrid taste, and is soluble in alcohol, and partially so in boiling water. It is heavier than water. Its constituents are *resin*, *essential oil*, and *cinnamic acid*.

Effects and Uses.—It is a stimulating blennorrhetic and tonic, occasionally employed in chronic catarrhs, asthma, gonorrhœa, leucorrhœa, &c., but not much used in this country. Externally, it is applied to indolent ulcers. Dose, f℥ss, in emulsion.

BALSAMUM TOLUTANUM—BALSAM OF TOLU.

Balsam of Tolu is the JUICE of Myrospermum Toluiferum (*Nat. Ord.* Leguminosæ), a tree of the neighborhood of Carthagena. It is procured from incisions in the trunk of the tree, and concretes in the vessels in which it is received. It has a soft, tenacious consistence, varying with the temperature, and by age becomes hard and resin-like. It is shining, translucent, of a reddish-brown color, a fragrant odor, and a warm, sweetish, pungent taste. It is inflammable, entirely soluble in alcohol and essential oils, and, like the other balsams, yields its acid to boiling water. Its ingredients are *resin*, *volatile oil*, and *cinnamic acid*.

Effects and Uses.—It is a stimulant blennorrhetic and tonic, useful in chronic catarrhal affections, and from its agreeable flavor, much employed as an ingredient of cough mixtures. The vapor of an ethereal solution of this balsam is inhaled with advantage for the relief of cough. Dose, gr. x–xxx, in emulsion, frequently repeated. The *tincture* (three troyounces to alcohol Oij) is added to cough mixtures; dose, f℥i–ij. The *syrup* (made by rubbing 2 fluidounces of tincture of Tolu with 120 grains of carbonate of magnesia, 2 troyounces of sugar, and a pint of water, filtering, and in the filtered liquid dissolving 24 troyounces of sugar at a gentle heat), is used as a vehicle for other medicines. Balsam of Tolu is an ingredient of the *compound tincture of benzoin.*

The following GUM-RESINS, previously noticed among *antispasmodics*, are employed as *expectorants:*

ASSAFŒTIDA (*Assafetida*). (See p. 88).

AMMONIACUM (*Ammoniac*). See. p. 91).

GALBANUM. (See p. 90).

ORDER VI.—EMMENAGOGUES.

Emmenagogues (from ἐμμήνια, *the catamenia*, and ἀγωγος, *exciting*) are medicines which promote the menstrual discharge. This discharge may be suppressed from various causes, and hence very opposite classes of remedies are employed to restore it. Thus, when amenorrhœa depends on *anœmia*, the PREPARATIONS OF IRON are the most effectual emmenagogues; on the other hand, when it occurs in connection with *plethora*, BLOODLETTING and EVACUANTS are resorted to. There are probably no articles which exert any specific influence upon the catamenia, as the discharge from the uterus is not one of the excretions through which medicinal agents pass out of the system. Medicines, however, which excite the pelvic circulation, and stimulate the organs in the neighborhood of the uterus, have a tendency to increase or excite the menstrual discharge. They are—

1. The *drastic cathartics*, as ALOES (p. 224), BLACK HELLEBORE (p. 233), &c.

2. Many of the *stimulating diuretics*, particularly CANTHARIS (p. 254).

3. Some of the *blennorrhetics*, particularly SENEKA (p. 256).

4. UAIACUM (p. 242), usually classed with the *diaphoretics*.

Indirectly, the menstrual discharge is frequently promoted by—

1. *Chalybeates*, which are the best emmenagogues in chlorotic and anæmic cases.

2. *Mercurials*, which prove emmenagogue from their influence in exciting the secretions generally.

The following articles are employed exclusively as emmenagogues:

SABINA—SAVINE.

Savine is the TOPS of Juniperus Sabina (*Nat. Ord.* Pinaceæ), a small, evergreen, bushy shrub of the south of Europe. They resemble closely the tops of *Juniperus Virginiana*, the indigenous *Red Cedar*, which are sometimes substituted for savine in the shops. The latter has a greenish color, a strong, peculiar, heavy odor, and a bitter, nauseous, resinous taste. Its virtues depend on a *volatile oil*, which is officinal.

Physiological Effects.—Savine is a local irritant. Taken internally, in medicinal doses, it stimulates the circulation and secretions, with a very decided action on the uterus. In large doses, it will cause vomiting, purging, and other symptoms of gastro-intestinal inflammation; and fatal results have sometimes occurred from its use to provoke premature labor.

Medicinal Uses.—Savine is employed *internally*, almost exclusively as an emmenagogue, and is considered one of the best medicines that can be used to stimulate the action of the uterine vessels. Pereira pronounces it "the most certain and

powerful emmenagogue of the whole Materia Medica." It has also been recommended in chronic rheumatism, and as an anthelmintic. *Topically*, it is used to keep up the discharge from blisters, to destroy warts, &c. Dose, in powder, gr. v–x; but it loses much of its oil by drying. *Ceratum Sabinæ* (three parts of savine dissolved in ether, to twelve parts of resin cerate) is used to make perpetual blisters.

Oleum Sabinæ (*Oil of Savine*) is the preparation principally used internally. Dose, gtt. v–x.

Ruta (*Rue*). The leaves of Ruta graveolens (*Nat. Ord.* Rutaceæ), a perennial European plant, are ranked among emmenagogues, and are used, popularly, to provoke abortion. Dose, gr. xv–xxx, two or three times a day. Of the *volatile oil*, the dose is gtt. ij–v.

Rubia (*Madder*). The root of Rubia tinctorum, or Dyer's Madder (*Nat. Ord.* Rubiaceæ), a European plant, is occasionally employed as an emmenagogue. Dose ʒss, three or four times a day.

CLASS III.—HÆMATICS.

ORDER I.—HÆMATINICS.

This order (from *αιματινα, the red coloring matter of the blood*), includes only the Preparations of Iron, or Chalybeates. The chalybeates increase the number of blood-corpuscles, or the amount of hæmatin in the blood, and are employed therapeutically in diseases dependent on a deficiency of these elements. They belong eminently to *hæmatics* (or medicines which occasion changes in the condition of the blood); but, as they possess also general and local tonic effects, independent of their action on the blood, they have been classed and treated of among the *mineral tonics* (see p. 123).

ORDER II.—ALTERATIVES.

Alteratives may be defined to be medicines, which produce such a modification of the tissues, as enables the vital principle to restore healthy action, in morbid conditions of the system. Their effects are chiefly owing to a correcting influence on the quality of the circulating fluid. Thus, in inflammations, they diminish the abnormal quantity of fibrin in the blood, render its red corpuscles less disposed to aggregation, and decrease the number and adhesiveness of its white globules. In part, also, their curative operation is of a *substitutive* character, by setting up an *antagonistic* action, which takes the place of diseased action in the system.

Under the influence of alteratives, the secretions and exhalations are increased, the textures softened, inflammatory action is arrested, and morbid growths and deposits are absorbed. The exudation of plastic or coagulable lymph is checked, and, as a consequence, also the formation of false membranes. Visceral and glandular enlargements and indurations are diminished and often disappear, and phlegmonous inflammation, of every kind, is opposed.

If pushed too far, the alteratives soften and even destroy the textures, impoverish the blood so as to interfere with the functions of nutrition, and produce a condition of marasmus and cachexia.

Their principal therapeutic employment is as *antiphlogistics* or *resolvents*. The *mercurials* are chiefly employed in *acute* inflammations,—the preparations of *iodine*, *bromine*, &c., in *chronic* inflammations. In the treatment of acute inflammatory affections, mercurials are among the most important of our resources—especially in such as have a tendency to terminate in effusions of coagulable lymph. The iodic and bromic preparations are adapted to inflammations of a chronic character—and are particularly serviceable in indurations or enlargements of glands and organs, and in affections of the bones and fibrous tissues.

By their *substitutive* or *antagonistic* action, alteratives are highly efficacious in the treatment of many diseases. In this way, syphilis is cured by the use of mercury, and intermittent fever by the use of arsenious acid.

Owing to the injurious results which follow the prolonged exhibition of alteratives, they are to be administered with caution, and their effects closely watched.

HYDRARGYRI PRÆPARATA—PREPARATIONS OF MERCURY.

Metallic mercury or quicksilver is obtained chiefly from the sulphuret (*native cinnabar*). The chief supply of quicksilver was long derived from Spain and Austria, but the markets of the United States are now furnished from New Almaden, in California. Mercury is an odorless, tasteless, volatile, liquid metal, of a whitish color. Its equivalent number is considered by some chemists to be 200, by others, 100; the nomenclature of its compounds varying with the equivalent number adopted.

While it retains the liquid metallic state, mercury is inert; but, when taken internally, it sometimes combines with oxygen in the alimentary canal, and thus becomes active. In the state of vapor, it frequently proves injurious—in some instances exciting salivation, ulceration of the mouth, &c.; in others inducing a peculiar affection of the nervous system, termed *shaking palsy* (*tremor mercurialis*), which is often attended with loss of memory, vertigo, and other evidences of cerebral disturbance, and sometimes terminates fatally. Workmen in quicksilver are liable to this affection. It is supposed by some chemists, that the activity of mercurial emanations is owing to the oxidation of the metal, before it is inhaled; by others, that, in the finely-divided state, in which it exists as a vapor, it is in itself poisonous.

All the compounds of mercury possess activity. Some of them are violent caustic poisons; all of them are more or less irritant. When the mercurials are taken internally, their

effects vary with the quantity administered. In *small* and *repeated* doses, their influence is first shown in an increase of the activity of the secernents and exhalants. The cutaneous, mucous, biliary, salivary, urinary, and, probably also, the pancreatic secretions, are all increased in amount, and, at the same time, the absorbent system becomes more active, so that accumulations of fluids, morbid enlargements, indurations, &c., will often disappear.

When mercury is given in *larger doses*, these effects are more intense. The mucous membrane of the mouth and the salivary glands not only take on increased secretory action, but become irritated and inflamed. The gums first show the mercurial influence, and are tender and tumefied; the whole mouth soon becomes sore; the tongue is swollen; and the saliva and buccal mucus flow abundantly, sometimes to the extent of several pints a day. At the same time, the breath acquires a peculiar fetidity, and the patient perceives a metallic taste in the mouth. The *resolvent* action of mercury is now still more obvious than when its impression is milder, and considerable emaciation usually ensues, from the absorption of fat. These effects, which are termed *sialagogue* (from the excessive flow of saliva), are commonly produced for the cure of diseases, and, as a general rule, gradually subside, leaving the health unimpaired. When, however, the use of mercury is pushed too far, or it is administered to persons peculiarly susceptible of its action, a train of very serious symptoms ensues—as excessive salivation, ulceration of the mouth, sloughing of the gums, loosening of the teeth, and, occasionally, necrosis of the alveolar processes. A peculiar febrile condition, called *mercurial fever*, diarrhœa, skin diseases, neuralgia, rheumatism, disorder of the nervous system, and marasmus, are other symptoms which are frequently noticed after the abuse of mercury.

After its absorption, mercury produces several important changes in the quality of the blood. Immediately upon the establishment of salivation, the blood exhibits an inflammatory crust; but, at a later period, it loses color, consistence, and coagulability, and the proportion of fibrin to serum becomes

diminished. This *antiplastic* action on the blood renders mercurials valuable as antiphlogistic remedies.

Medicinal Uses.—Liquid metallic mercury was formerly administered to remove mechanical obstructions of the bowels, but its use has been abandoned. The preparations of mercury are employed therapeutically with various objects.

1. As *indirect tonics* and *cholagogues*,—with a view to their action on the secretions,—in dyspepsia and constipation, accompanied with torpor of the liver, in gout, rheumatism, chronic skin diseases, &c. Blue pill, mercury with chalk, and calomel, are employed with this view; the two former are preferred as least irritating.

2. As *sialagogues*. The chief value of mercurials is shown when a full impression is made on the system, as evidenced by salivation. This condition is usually established by the *internal* exhibition of mercurials, but it may also be produced by *friction* or by *fumigation*. In putting the system under the influence of mercury, it is not necessary to excite a high degree of ptyalism, though in chronic diseases, it is often proper to keep up the effect for some time. During the maintenance of ptyalism, the patient should use warm clothing, avoid exposure to cold, and take light and nourishing food. If excessive discharge or ulceration occur, astringent gargles, as brandy and water, solutions of chloride of soda or lime, alum, &c., may be employed. In cases of sloughing sores, nitrate of silver or the mineral acids should be applied. Gastro-enteric irritation is to be treated with laxatives and opiates. The mercurial cachexia requires change of air, generous diet, tonics, &c. When the system is contaminated with mercury, it may be eliminated by the use of iodide of potassium, which forms soluble compounds with the mercury retained in the economy.

As sialagogues, mercurials are chiefly employed in fevers, inflammations, dysentery, cholera, and syphilis. In *fevers*, mercurials are used with a view both to their action on the secretions, and to a gentle sialagogue influence. It is in *inflammations* that the value of mercurials is most conspicuous. After depletion, the mercurial preparations, from their antiplastic

action on the blood, are probably the most efficacious means at our command for the relief of internal inflammations. They are *most* useful in inflammations of *serous* tissues, especially where these are connected with the exudation of coagulable lymph, and also where there is a tendency to the formation of false membrane, as in *plastic* croup. In scrofulous, malignant, or gangrenous inflammations, mercury is objectionable. In *dysentery* and *cholera*, mercurials are highly valuable remedies, and enter into nearly all the varieties of treatment adopted in these diseases. In *syphilitic* diseases, mercury has long been regarded as the only reliable curative agent. It has no direct curative influence on the primary symptoms; but, after the system has been contaminated with the syphilitic virus, mercury is the most certain and rapid means of eradicating it. In hepatic and inflammatory *dropsies*, mercurials are employed with advantage, with a view to their action both on the secretions and absorbents. Where much debility exists, however, and in granular diseases of the kidneys, mercurials are objectionable. The preparations of mercury have been exhibited as sialagogues in many other diseases, as paralysis, colica pictonum, chronic visceral diseases, particularly of the lungs and liver, &c. They must be always considered as contra-indicated in scrofulous or tuberculous subjects, in cases of malignant disease, in extensive suppurations, marasmus, Bright's disease of the kidneys, &c.

Blue pill and calomel are the sialagogues principally resorted to; but other preparations, as the iodides, are employed in syphilis. In administering mercurials, for their sialagogue action, we sometimes observe a *cumulative* effect: they may be exhibited, particularly to children, for some time without result, when suddenly the most violent symptoms of mercurial saturation will be developed.

3. As *purgatives*. The employment of calomel, blue pill, and mercury with chalk, as cathartics and anthelmintics, has been previously noticed (see p. 237).

The following are the preparations of mercury which are employed medicinally:

1. Metallic Mercury. When intimately mixed with pulverulent or fatty bodies, mercury loses its liquid character—is said to be *killed*, *extinguished*, or *mortified*—and acquires medicinal activity. Its activity is probably owing to its reduction to a state of minute division, which enables it to enter into combinations in the stomach. The officinal preparations of metallic mercury are: *Pilulæ Hydrargyri* (*Pills of Mercury*), *Unguentum Hydrargyri* (*Mercurial Ointment*), *Emplastrum Hydrargyri* (*Mercurial Plaster*), *Hydrargyrum cum Cretâ* (*Mercury with Chalk*).

2. Oxides. — *Hydrargyri Oxidum Nigrum* (*Black Oxide of Mercury*), *Hydrargyri Oxidum Rubrum* (*Red Oxide of Mercury*).

3. Chlorides.—*Hydrargyri Chloridum Mite* (*Mild Chloride of Mercury, or Calomel*), *Hydrargyri Chloridum Corrosivum* (*Corrosive Chloride of Mercury*, or *Corrosive Sublimate*).

4. Iodides.—*Hydrargyri Iodidum Viride* (*Green Iodide of Mercury*), *Hydrargyri Iodidum Rubrum* (*Red Iodide of Mercury*).

5. *Hydrargyri Cyanidum* (*Cyanide of Mercury*).

6. *Hydrargyrum Ammoniatum* (*Ammoniated Mercury*).

7. *Hydrargyri Sulphas Flava* (*Yellow Sulphate of Mercury*).

8. *Hydrargyri Sulphuretum Rubrum* (*Red Sulphuret of Mercury*).

9. Nitrates.—*Unguentum Hydrargyri Nitratis* (*Ointment of Nitrate of Mercury*), *Liquor Hydrargyri Nitratis* (*Solution of Nitrate of Mercury*).

Pilulæ Hydrargyri (*Pills of Mercury*). This preparation, generally known as *Blue Pill*, is made by rubbing mercury (a troyounce) with confection of rose (a troyounce and a half), till all the globules disappear; then adding powdered liquorice root (half a troyounce), and beating the whole into a mass. The trituration is now generally effected by machinery—usually by steam power. It is a soft, dark blue mass, of a convenient consistence for making into pills. The mercury is in a state

of minute division, and is chemically unaltered, though, perhaps, a very small portion of it is in a state of oxidation. Three grains of the pilular mass contain one grain of mercury. The preparation changes color from being kept, becoming of an olive and even reddish tint, in consequence of the further oxidation of the metal. As it is often adulterated, it is important that it should be purchased of a reliable house.

Effects and Uses.—In full doses (gr. v–xv), blue pill acts as a *laxative;* when given for this purpose, it is usually followed in a few hours by a saline cathartic. In doses of gr. i–ij–iij, repeated at proper intervals, it is employed as an *alterative* or *sialagogue*, and is the favorite preparation for exciting salivation in chronic affections. When it moves the bowels, opium is combined with it. It may be pleasantly given suspended in mucilage or syrup.

Unguentum Hydrargyri (*Mercurial Ointment*) is made by rubbing two parts of mercury with one part of suet and lard each, until the globules disappear. It is an unctuous, fatty body, of a bluish-gray color, consisting of equal weights of *fatty matter* and finely divided *mercury*. A very small portion of protoxide is, perhaps, present, and, as the ointment becomes darker by age, a further oxidation of the mercury probably takes place.

Effects and Uses.—Mercurial ointment, when either swallowed or rubbed into the integuments, produces the constitutional effects of mercury; locally, it has but little irritant effect. It is scarcely ever used *internally* in the United States or Great Britain, though, in France, it is highly esteemed as a sialagogue, in the dose of gr. ij, repeated. *Externally*, it is used to mercurialize the system by friction, or applied to blistered surfaces; to disperse non-malignant tumors; as a dressing to syphilitic sores; to destroy pediculi; and to prevent suppuration and pitting in small-pox.

Emplastrum Hydrargyri (*Mercurial Plaster*), is made by rubbing 6 troyounces of mercury with 2 troyounces of olive oil and resin each previously melted together, till the globules disappear; and then adding 12 troyounces of melted lead plaster.

It is used as a discutient of venereal and other enlargements, &c., and is applied to the side in chronic hepatitis; it may induce salivation. The *plaster of ammoniac with mercury* (made with ammoniac, mercury, olive oil, and sulphur) is more stimulating than the foregoing.

Hydrargyrum cum Creta (*Mercury with Chalk*), is prepared by rubbing three parts of mercury with five parts of *prepared chalk*, till all the globules disappear. It is a grayish powder, containing mercury chiefly in a state of minute division. In full doses, it is a gentle laxative, milder even than blue pill; in smaller doses, it is an excellent alterative; and the chalk renders it antacid. It is chiefly employed as an alterative in infantile cases. Dose, for adults, gr. v–xx; for children, gr. ij or iij to gr. viij or x, in *powder*, and not in pills, as in the latter form the mercury becomes squeezed out of the chalk.

Hydrargyri Oxidum Nigrum (*Black Oxide of Mercury*). This preparation, although discarded from the Pharmacopœia, has still claims to notice. It is obtained by agitating calomel (protochloride of mercury) in a solution of potassa; chloride of potassium is formed in solution, and protoxide of mercury (one equivalent of oxygen and one equivalent of mercury) (Hg O), precipitates. As first prepared, it is a greenish-black powder; but, on exposure to light or heat, it is converted into a mixture of metallic mercury and deutoxide, and becomes olive-colored. It is odorless, tasteless, insoluble in water, but soluble in nitric and acetic acids. Its effects are alterative, sialagogue, and purgative, and it is one of the least irritating of the mercurial preparations—but it is little used internally, on account of the uncertainty of its composition. Dose, gr. $\frac{1}{4}$ to gr. i–ij, in pill. Externally, it has been employed as a fumigating agent; also, as an application to chancres and other sores, suspended in a weak solution of chloride of calcium, under the name of *black wash* (made extemporaneously by adding calomel ʒj, to lime-water Oj).

Hydrargyri Oxidum Rubrum (*Red Oxide of Mercury*). This is the *deutoxide* or *peroxide* of mercury (consisting of

one equivalent of metal and two equivalents of oxygen), (HgO_2). It is usually made by dissolving mercury in diluted nitric acid, with a gentle heat, by which nitrate of the deutoxide of mercury is formed; and the nitric acid is afterwards decomposed and driven off by calcination. The deutoxide of mercury, which is commonly called *red precipitate*, occurs in small, shining scales, of a brilliant red color, with a shade of orange. It has an acrid taste, and is nearly insoluble in water. Its effects are those of a powerful irritant, and, when taken internally, even in small doses, it excites vomiting and purging —in large doses, gastro-enteritis. It is rarely or never used internally (dose, gr. $\frac{1}{16}$–$\frac{1}{8}$); externally, it is applied as an escharotic, either in powder or ointment, to chancres, indolent ulcers, &c. The *yellow wash* (a favorite application to phagadenic venereal ulcers) consists of red oxide of mercury, suspended in a weak solution of chloride of calcium and caustic lime; it is made by adding corrosive sublimate (gr. ij, or less) to lime water (f℥j). *Unguentum hydrargyri oxidi rubri* (*ointment of red oxide of mercury*), consists of one part of red oxide mixed with eight parts of ointment of lard: it is a very useful stimulating ointment in indolent ulcers, porrigo, ophthalmia, &c.

Hydrargyri Chloridum Mite (*Mild Chloride of Mercury*). This preparation, well known as *calomel*, consists of one equivalent of chlorine and of mercury, each, and is a protochloride of mercury (HgCl). It is made by subliming a mixture of protosulphate of mercury and chloride of sodium (common salt); a double decomposition takes place, by which chloride of mercury and sulphate of soda are formed. The protosulphate of mercury is previously obtained by boiling mercury in sulphuric acid, and afterwards triturating the resulting bisulphate of the deutoxide with mercury. *Calomel*, as thus procured in mass, is liable to contain a little corrosive sublimate. It should be reduced to powder, and washed repeatedly with boiling distilled water, until the absence of a white precipitate with ammonia shows that the corrosive subli-

mate has been removed. With a view of obtaining calomel in a state of very minute division, its vapor is condensed in a receiving vessel filled with steam, whereby it takes the form of a very fine powder, and is perfectly free from corrosive sublimate. The calomel thus prepared (known as *Jewell's* or *Howard's* calomel) is finer and more active than can be obtained by levigation and elutriation.

Calomel, as usually manufactured by sublimation, is in the form of white, fibrous, crystalline cakes. It may be obtained in the shape of quadrangular, prismatic crystals. As found in the shops, it is a light-buff or ivory-colored powder, tasteless, inodorous, insoluble in water, alcohol, and ether, unalterable in the air, but blackening by long exposure to light. It should be kept in bottles painted black or covered with black paper. *Jewell's* calomel is a perfectly white powder. *When pure*, calomel is completely vaporizable by heat; it strikes a black color, free from reddish tinge, with solutions of the fixed alkalies; and should not, when digested with water, form a white precipitate with ammonia, unless it contain corrosive sublimate.

Incompatibles.—The alkalies, alkaline earths, alkaline carbonates, soaps, and hydrosulphates, are *incompatible* with calomel. Nitro-muriatic acid should not be prescribed with it, for fear of generating corrosive sublimate. Preparations containing hydrocyanic acid, the chlorides of sodium and potassium, and muriate of ammonia, produce the same change. It is asserted that calomel is converted into corrosive sublimate in the stomach by the muriatic acid which it encounters, but there are many reasons for rejecting this hypothesis.

Effects and Uses.—Calomel produces the effects of the mercurials already described, and, in purgative doses, proves also a valuable anthelmintic. From the certainty and mildness of its operation, it is more employed than any of the other preparations of mercury, although blue pill, which if less certain, is milder, is preferred under some circumstances. Calomel has been frequently taken in very large doses, without any bad effects; but cases are recorded in which, in excessive quantity, it has acted

as an irritant poison. As a *purgative*, it is employed in doses of gr. vi–xij, in fevers, hepatitis, colica pictonum, dysentery, and many other affections; as an *anthelmintic*, in the same doses; and, in both cases, it is to be followed in a few hours by a saline draught, castor oil, or senna. Calomel is often given in combination with other cathartics, as jalap, rhubarb, aloes, scammony, colocynth, and gamboge. In very large doses, as ℈j to ℥ss, or even more, it is said to possess *sedative* powers, and has been recommended in dysentery, cholera, puerperal fever, &c. As an *antiphlogistic*, in inflammatory cases, calomel is given in doses of gr. $\frac{1}{2}$ to gr. j, every one, two, or three hours; as an *alterative*, in these doses, twice or thrice a day. In the dose of gr. j, frequently repeated, it is one of the best means of checking obstinate vomiting. It is frequently added to other medicines to increase their action on the secretions, as diuretics, antimonials, &c. To children, calomel may be given in proportionally larger doses than to adults, and it rarely salivates them. In infantile diarrhœa, very minute doses of calomel, as gr. $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{16}$, every hour or two, are highly efficacious. *Externally*, calomel is applied in powder, as an errhine, in amaurosis; and, made into an ointment (a drachm to a troyounce of lard), it is an excellent application in a variety of cutaneous affections.

Hydrargyri Chloridum Corrosivum (*Corrosive Chloride of Mercury*). This is the bichloride of mercury, commonly called *corrosive sublimate*, consisting of two equivalents of chlorine and one equivalent of mercury ($HgCl_2$). It is made by subliming a mixture of chloride of sodium and bisulphate of the deutoxide of mercury (which is previously obtained by boiling mercury with sulphuric acid); and double decomposition takes place, resulting in the formation of bichloride of mercury and sulphate of soda. Corrosive sublimate occurs in the form of white, semi-transparent, crystalline masses, permanent in the air, inodorous, and of an acrid, styptic taste. It is tolerably soluble in cold water, and very soluble in boiling water, alcohol, ether, and the mineral acids. The aqueous solution, when exposed to light, is decomposed, with the precipi-

tation of calomel and evolution of hydrochloric acid. It is *incompatible* with many of the metals, the alkalies and their carbonates, soap, lime-water, tartar emetic, nitrate of silver, the acetates of lead, the sulphurets and iodides of potassium and sodium, and all the hydrosulphates. The *tests* for detecting corrosive sublimate as a poison are, in the order of their delicacy, ferrocyanide of potassium, lime-water, carbonate of potassa, iodide of potassium, ammonia, sulphuretted hydrogen, and protochloride of tin.

Physiological Effects.—In medicinal doses as gr. $\frac{1}{16}$–$\frac{1}{8}$, corrosive sublimate occasions a beneficial alterative effect, without any obvious activity. Its continued use may cause salivation, but it has less tendency to produce this result than any other preparation of mercury. Medicinal doses, if too large or too long-continued, frequently produce gastro-enteric symptoms and the constitutional effects of mercury. In excessive doses, corrosive sublimate is a violent *caustic poison*, from its affinity for albumen, fibrin, and other constituents of the tissues. It produces the most intense gastro-enteritis, sometimes followed by the ordinary constitutional effects of mercury. The best *antidote* is *albumen* (in the form of white of eggs); or, if this is not attainable, *gluten* (in wheat flour), or *casein* (in milk), may be substituted. The *protosulphuret of iron* (if given immediately), and a mixture of *iron filings* (two parts) with *gold dust* (one part), also decomposes corrosive sublimate. In cases of poisoning, the stomach must be evacuated as soon as possible, and the after treatment consists in the free use of demulcents, opiates, and topical depletion.

Medicinal Uses.—Corrosive sublimate is chiefly used as an alterative in secondary syphilis; also in cutaneous and rheumatic affections, and as a sorbefacient in old dropsies. Dose, gr. $\frac{1}{16}$–$\frac{1}{8}$, three or four times a day, in pill or solution. *Externally*, it may be used as a caustic; a weak solution (gr. $\frac{1}{2}$–i–ij to water f$\bar{3}$j) is much employed as a wash to ulcers, an injection in gleet, a collyrium, &c. An ointment (gr. $\frac{1}{2}$–i–ij to lard $\bar{3}$j), is a good application in porrigo.

Hydrargyri Iodidum Viride (*Green Iodide of Mercury*), is made by rubbing mercury and iodine together, with the addition of a little alcohol. It is a protiodide, consisting of one equivalent of iodine and mercury each (HgI), and is a yellowish-green powder, insoluble in water and alcohol, but soluble in ether. By exposure to light it is partially decomposed, and becomes of a dark-olive color.

Effects and Uses.—This mercurial exercises a specific influence over the lymphatic and glandular systems, and is employed in syphilis and scrofula occurring in the same individual. Dose, gr. j, gradually increased to gr. iij or iv; it should not be given with iodide of potassium, which decomposes it. *Externally*, it is applied, in the form of ointment, to syphilitic ulcers, &c.

Hydrargyri Iodium Rubrum (*Red Iodide of Mercury*), is the biniodide, consisting of one equivalent of mercury and two equivalents of iodine (HgI_2). It is made by mixing solutions of iodide of potassium and bichloride of mercury, from which a double decomposition ensues, resulting in the formation of chloride of potassium in solution, and biniodide of mercury is precipitated. It is a scarlet-red powder, insoluble in water, but soluble in alcohol and solutions of iodide of potassium, chloride of sodium, &c. It is a powerful irritant and caustic, and is employed in the same cases as the protiodide, though much more energetic. Dose, gr. $\frac{1}{16}$, gradually increased to gr. $\frac{1}{4}$, in pill or alcoholic solution. *Externally*, it is much used in the form of ointment.

Hydrargyri Cyanidum (*Cyanide of Mercury*). This salt is made by adding a solution of ferrocyanide of potassium to sulphuric acid, by which hydrocyanic acid is produced, and this, being received in a vessel containing water and red oxide of mercury, generates water and bicyanide of mercury ($HgCy_2$). It is usually found in the form of permanent, prismatic, white, and opaque crystals, of a disagreeable styptic taste, soluble in water, but not in alcohol. It is an active poison, and is used as an antisyphilitic remedy, as a substitute for corrosive sublimate, over which it has the advantage of not producing epigas-

tric pain, and not being decomposed by alkalies and organic substances. Dose, gr. $\frac{1}{8}$ to $\frac{1}{16}$.

Hydrargyrum Ammoniatum (*Ammoniated Mercury*). This preparation, commonly called *white precipitate*, is made by precipitating a solution of bichloride of mercury by ammonia; muriate of ammonia is formed in solution, and ammoniated mercury is thrown down. It consists of one equivalent of bichloride of mercury and one equivalent of a compound consisting of one equivalent of mercury combined with two equivalents of *amidogen* (or ammonia deprived of one equivalent of hydrogen). In symbols the reaction may be thus expressed: $4NH_3+2HgCl_2=Hg,2NH_2+HgCl_2+2(NH_3,HCl)$. It is a perfectly white powder, insoluble in water and alcohol, decomposed by boiling water, inodorous, and has an earthy, afterwards metallic taste. It is largely adulterated, chiefly with sulphate of lime. Its *effects* are poisonous, but it is *used* only as an external application, in the form of *ointment* (*unguentum hydrargyri ammoniati*, one part of ammoniated mercury to twelve parts of ointment of lard), to cutaneous eruptions, and to destroy pediculi.

Hydrargyri Sulphas Flava (*Yellow Sulphate of Mercury*). This salt, commonly called *turpeth mineral*, is made by throwing the bisulphate of the deutoxide of mercury (as obtained from the action of sulphuric acid on mercury), into *boiling water;* the bisulphate is instantly decomposed, and a basic sesquisulphate of the deutoxide of mercury—*turpeth mineral*—($3HgO_2,2SO_3$), is precipitated. It is an inodorous, lemon-yellow powder, of a rather acrid taste, and almost insoluble in water. It has been employed as an *alterative*, in doses of gr. $\frac{1}{4}$–$\frac{1}{2}$; as an *emetic*, in croup and chronic enlargement of the testis, in doses of gr. ij–v; and as an *errhine*, in chronic ophthalmia and diseases of the head. In an overdose, it is poisonous, ℥j having proved fatal.

Hydrargyri Sulphuretum Rubrum (*Red Sulphuret of*

Mercury), or *Cinnabar* (which is found as a *native* combination), is manufactured by subliming a mixture of one part of sulphur and five parts of mercury. It consists of one equivalent of mercury and two equivalents of sulphur (HgS_2), and occurs in the form of heavy, brilliant, deep-red, crystalline masses, which are inodorous, tasteless, entirely volatilizable by heat, and insoluble in water and alcohol. It is not employed internally, but is used in the way of *fumigation* in venereal ulcers of the throat and nose; ʒss may be thrown on a red-hot iron and inhaled; but the *black oxide* is a better substance for mercurial fumigation. Cinnabar is used as a paint, under the name of *vermilion*.

Unguentum Hydrargyri Nitratis (*Ointment of Nitrate of Mercury*). The *nitrate of mercury* is employed chiefly in the form of ointment. This preparation, known as *citrine ointment*, is made by dissolving a troyounce and a half of mercury in $3\frac{1}{2}$ troyounces of nitric acid, and adding the solution to a melted mixture of 12 troyounces of neat's-foot oil and $4\frac{1}{2}$ troyounces of lard, stirring until effervescence ceases. The chemical changes which result here are not prescisely known; but a subnitrate of the deutoxide of mercury is probably formed, with fatty acids and elaïdin. Citrine ointment has a fine yellow color and unctuous consistence; but, if not very carefully made, it becomes greenish, hard, and friable. It is an excellent stimulant and alterative application, much employed in porrigo, psoriasis, crusta lactea, impetigo, psorophthalmia, and a wide range of ulcerated and eruptive affections. It is best to dilute it, at first, with lard.

Liquor Hydrargyri Nitratis (*Solution of Nitrate of Mercury*) ($HgO_2,2NO_5$), is made by dissolving 3 troyounces of mercury in 5 troyounces of nitric acid, mixed with 6 fluidrachms of distilled water. It is a dense, transparent, nearly colorless liquid, of a strongly acid taste, and is employed as a caustic application in malignant ulcers and cutaneous affections.

IODINIUM—IODINE.

Iodine is an elementary non-metallic substance, found in the vegetable, animal, and mineral kingdoms of nature,—as marine plants, oysters, sponges, mineral springs, &c. It is chiefly manufactured from *kelp* (the impure soda obtained from the incineration of sea-weeds), in which it exists as an iodide of sodium, by the action of sulphuric acid and deutoxide of manganese. It occurs in crystalline scales, of a bluish-black color and metallic lustre, of a strong, peculiar odor, and a hot, acrid taste. It is very volatile—evaporating even at common temperatures—is freely soluble in alcohol and ether, and but very slightly soluble in water. Its solubility in water is very much increased by the addition of certain salts, as the iodide of potassium, chloride of sodium, &c. When heated, its vapor has a rich violet color, whence its name (from ἰώδης, violet). Iodine may be detected in very minute quantity by *starch*, which produces with it a deep-blue color; if in combination, the iodine must be first freed with a little nitric acid, or still better with *chromic acid*, (which may be evolved by the addition of a single drop of very dilute solution of bichromate of potassa, when starch and nitric acid have been employed ineffectually). Chloroform has also been proposed as a test.

Physiological Effects.—Iodine acts *locally* as an irritant; when applied to the skin it stains it yellow, and causes itching, redness, and desquamation; and, when inhaled in the form of vapor, it excites cough and heat in the air-passages. Taken internally, in *medicinal doses*, it frequently produces a remedial alterative and resolvent effect, without any obvious disturbance of the functions. Usually, patients become thin under its use, though sometimes its alterative action on the nutrition produces embonpoint. If administered in too large doses, or to persons of irritable stomachs, it produces subacute gastro-enteritis; and, when continued for a long time, it will produce gastro-enteric symptoms—headache, giddiness, and other evidences of cerebro-spinal disturbance—marasmus—sometimes

discoloration of the skin—occasionally salivation—and frequently a *wasting of the mammæ and testicles.* This train of symptoms is termed *iodism.* The influence of iodine on the secretions is uncertain, but it commonly stimulates them. In excessive doses, it may act as an irritant poison, and has even produced death; but such a result is rare. Enormous quantities have been taken with very slight effects. The antidote is starch. The absorption of iodine is shown by its presence in the blood and various secretions.

Medicinal Uses.—Iodine is a most valuable *resolvent* remedy, in chronic visceral and glandular enlargements, indurations, thickening of membranes, tumors, &c. It is chiefly employed in *bronchocele* and *scrofula*, but it is useful in every variety of chronic tumor and enlargement; also as an alterative in secondary syphilis and other chronic affections; and as an emmenagogue. Its *vapor* has been inhaled with benefit in chronic bronchitis and phthisis. It is a valuable *topical* remedy and is applied in the form of tincture, with the greatest advantage, in the various cutaneous affections, lupus, erysipelas, rheumatism, gout, phlegmons, carbuncles, wounds, diseases of joints, poisoned parts, to prevent pitting in smallpox, as an *injection* in hydrocele, in encysted bronchocele, and even into the pleural cavity in chronic pleurisy, &c., &c. Iodine ranks also among the best of the disinfectants, being very available from the ease of its application as well as its ready portability.

Administration.—Iodine is rarely exhibited alone, but usually in conjunction with iodide of potassium (see p. 291). To avoid gastric irritation, it is best given after a meal, particularly when amylaceous substances have been taken, as it forms with them iodide of starch. Dose, gr. $\frac{1}{4}$–$\frac{1}{2}$, two or three times daily. *Liquor Iodinii Compositus—Compound Solution of Iodine*—(Iodine ʒvj, Iodide of potassium ā troyounce and a half, distilled water Oj), is the usual preparation in which iodine is administered internally; dose, six drops, three times a day, in sweetened water, and gradually increased. The *tincture* (a troyounce to alcohol Oj) is of a deep-brown color, and undergoes a gradual change, when kept long; water precipitates the

iodine from it, and hence it is little employed internally; dose, gtt. x–xx, repeated and increased. *Externally*, it is extensively applied to erysipelatous and poisoned parts, chilblains, in cutaneous affections, &c., &c. The *compound tincture* (iodine half a troyounce, iodide of potassium a troyounce, alcohol Oj), has the advantage over the tincture, that it may be diluted with water without decomposition; dose, gtt. xv–xxx. The *ointment—unguentum iodinii*—(made with iodine ℈j, iodide of potassium gr. iv, water ♏vj, and lard a troyounce), is employed as a local application in goitre, scrofulous tumefactions, &c.; it does not keep well. *Unguentum iodinii compositum* (iodine 15 grains, iodide of potassium 30 grains, water 30 minims, lard a troyounce), is used for the same purpose, as the preceding; they both impart an orange color to the skin. *Iodine baths* have been employed, with iodine and iodide of potassium dissolved in water, in a *wooden* bath-tub, in the proportion of iodine gr. iij, and iodide gr. vj, to a gallon of water.

Iodine is employed in medicine, in various chemical combinations. The *iodides of iron*, *lead*, and *mercury*, have been noticed. The *iodide of starch* is highly recommended; dose, a teaspoonful, three times a day, to be increased. The *iodide of zinc* is employed as a tonic and astringent. The *iodide of sulphur*, in the form of ointment, is used in various skin diseases.

POTASSII IODIDUM—IODIDE OF POTASSIUM.

This salt is prepared by treating an aqueous solution of potassa with iodine in slight excess. By this process, a mixture of iodide of potassium and iodate of potassa is obtained, and the iodate is afterwards deoxidized and converted into iodide by heat and mixture with powdered charcoal. Iodide of potassium consists of one equivalent of iodine and potassium, each, (KI). It occurs in semi-opaque, white, or transparent crystals, permanent in a dry air, rather deliquescent in a moist one, of an acrid, saline taste, somewhat like that of common

salt. It is readily soluble in water and alcohol, and its aqueous solution dissolves iodine, forming *ioduretted iodide of potassium*. It is frequently adulterated with other salts.

Effects and Uses.—The effects of iodide of potassium are analogous to those of iodine, but less energetic. *Locally*, it acts as an irritant, and, in large doses, sometimes occasions nausea, vomiting, heat of stomach, and purging; but it may be given in larger doses, and for a longer period, than iodine, without causing gastro-enteric derangement. It stimulates the secretions, particularly those from mucous membranes, and very often produces coryza. Its constitutional effects are powerfully *alterative* and *resolvent*, and it is employed in *bronchocele*, *scrofula*, *secondary syphilis*, and other chronic diseases, particularly those accompanied with enlargements or indurations. It is superior to mercury as an anti-syphilitic remedy, when the bones and fibrous tissues are affected. In chronic rheumatism and gout, particularly where the fibrous tissues are attacked, it is of great efficacy. As a diuretic in dropsy, it has been found useful; and in spasmodic asthma it often gives great relief. As an eliminative antidote, in mercurial and saturnine poisoning, its action has been already noticed. It has been recommended in hydrocephalus; and has recently been found to exercise a beneficial operation in the treatment of aneurism.

Administration.—Dose, gr. v–xv, or even more, three times a day, in solution. An *ointment* (℥j to lard a troyounce, with water f℥j) is employed for the same purposes as iodine ointment, and does not discolor the skin; it is, however, of feebler efficacy.

Ammonii Iodidum—Iodide of Ammonium (NH_4I) is made by the double decomposition of iodide of potassium and sulphate of ammonia in hot aqueous solution. It occurs as a crystalline powder, soluble in water, of a taste like that of iodide of potassium, but a little sharper. It has been used in the same way as the latter salt.

Sodii Iodidum—Iodide of Sodium may be made by the

double decomposition of iodide of iron and carbonate of soda. It is a soluble, white, crystalline salt, used to fulfil the same indications as iodide of potassium, than which it is said to be better borne.

IODOFORMUM—IODOFORM is obtained by the action of chlorinated lime upon a heated alcoholic solution of iodide of potassium. It is a teriodide of formyl (C_2HI_3), and occurs in the form of small, pearly, yellow crystals, having a saffron-like odor and sweet taste, insoluble in water, but soluble in alcohol and ether. It is devoid of irritant action, and produces the constitutional effects of iodine, besides an anodyne influence. Dose, 1 to 3 grains, three times a day in pill. In the form of *vapor*, it possesses anæsthetic properties, but inferior to those of chloroform.

BROMINIUM—BROMINE.

Bromine is an elementary body, bearing close chemical and medicinal affinities to iodine. It is a constituent of sea-water, and of many mineral springs. In Europe, it is obtained principally from the mother liquors of the salt mines of Stassfurt, in Germany; in this country, from saline springs in western Pennsylvania, Ohio, and West Virginia, in which it exists as a bromide of magnesium. It is a volatile, red liquid, of a caustic taste, and a strong, disagreeable smell, sparingly soluble in water, more soluble in alcohol, and still more so in ether. Its *effects on the system* are very analogous to those of iodine, and it has been employed as an alterative resolvent in bronchocele, scrofulous tumors, skin diseases, &c., particularly in cases in which iodine does not answer, or has lost its activity. It is exhibited in *aqueous solution* (1 part to 40 parts of distilled water); dose, six drops, several times a day. It is a good application in hospital gangrene, and, properly diluted, it is used as a wash for ulcers. In overdoses, bromine is an irritant poison, and has proved fatal; ammonia is said to be an *antidote*.

Potassium Bromidum (*Bromide of Potssium*) (KBr), is prepared by adding a solution of pure carbonate of potassa to a solution of bromide of iron. The iron is precipitated, and bromide of potassium remains in solution, from which it is obtained by evaporation. It occurs as a permanent, colorless, anhydrous, crystalline salt, of a pungent, saline taste, very soluble in water, and slightly soluble in alcohol. Bromide of potassium has been used as a substitute for the iodide, in bronchocele, scrofula, chronic cutaneous affections, secondary syphilis, fibroid tumors of the uterus, &c., but it is inferior in these diseases to the iodic salt. It has, however, proved a very efficacious remedy in diseases of the nervous centres, as whooping-cough, infantile convulsions, hysteria, laryngismus stridulus, and especially epilepsy, over which it is believed now to exert more control than any other article of the Materia Medica. In the insomnia of mania and of mania-a-potu, it is often efficacious; and it has been found to be the most efficient remedy which we possess in allaying venereal excitement, and hence its employment in nymphomania, chordee, &c., and as a preventive of masturbation, in prisons, barracks, &c. Given with or before opium, it often prevents the unpleasant effects of that article. Dose, from five to ten and even twenty grains, several times a day.

Ammonii Bromidum (Bromide of Ammonium) (NH_4Br), is prepared by dissolving bromine in water of ammonia, or by acting on bromide of iron with carbonate of ammonia. It occurs in colorless crystals, which, on exposure to the air, gradually become yellowish (in consequence of the liberation of hydrobromic acid), has a saline, pungent taste, is very soluble in water, and moderately soluble in alcohol. Its effects, uses, and doses are analagous to those of bromide of potassium. It is also highly recommended in doses of ten or fifteen grains every two or three hours in acute rheumatism.

The Bromide of Sodium (NaBr) has lately been employed in preference to the bromide of potassium, as having more bromine; and still more recently, the Bromide of Lithium (LBr) has been recommended as the most efficacious of the

bromides. In bromide of potassium there is about 66 per cent. of bromine; in bromide of sodium, 78 per cent.; and in bromide of lithium, nearly 92 per cent. Bromides of iron and mercury have been also employed.

OLEUM MORRHUÆ—COD-LIVER OIL.

This is a FIXED OIL, obtained from the LIVER of Gadus Morrhua, or the *common cod*,—a well-known fish of the Northern Atlantic,—and probably, also, from the livers of several other species of Gadus. It is prepared by subjecting the livers to heat, either in boilers with water, or by means of steam externally applied, and afterwards draining off the liquid portion, from which the oil separates on standing. It is said to be sometimes procured also by expression. Three varieties are known, the *white* or *pale-yellow*, the *brownish-yellow*, and the *dark-brown*. They differ chiefly in the mode of preparation—the *pale* being prepared from fresh livers, the *dark-brown* from those which are collected at sea and have undergone putrefactive decomposition, and the *brownish yellow* from those in which putrefaction has only partially commenced. The pale oil is the purest; the dark oil is the most offensive to the taste and smell, and the least acceptable to the stomach.

Cod-liver oil is of the consistence of lamp-oil, and has a peculiar odor and taste, resembling that of shoe-leather, which is usually prepared in the United States with this oil. These sensible properties are probably the best test of the genuineness of the oil, and it should be rejected, if the smell and taste of shoe-leather are wanting, or if those of lamp-oil or fish-oil are very perceptible. The sp. gr. of the best oil is about 0.917. The oil undergoes a gradual change from exposure to the air, and should therefore be kept in full and well-stoppered bottles. It contains a great variety of *chemical constituents*, the most important of which are *fatty acids*, several *biliary principles*, a peculiar brown substance called *gaduin* (which is not, however, supposed to be the *active* ingredient), *iodine*, *chlorine*, and traces of *bromine*.

Cod-liver oil may be distinguished from other oils by the agency of sulphuric acid, a drop of which, when added to fresh cod-liver oil, on a porcelain plate, causes a centrifugal movement in the oil, and gives rise to a fine violet color, soon passing into yellowish or brownish-red. This reaction is attributable, however, to the bile contained in the oil. By the addition of ammonia, lime, or potassa, the peculiar volatile principle, *propylamia* (the odorous principle of pickled herring), is developed.

Physiological Effects.—The prolonged use of cod-liver oil, in doses which allow it to be retained by the stomach, produces very marked beneficial effects in a wide range of chronic diseases, dependent on a vitiated condition of the functions of digestion, assimilation, and nutrition. Its modus medendi is not well understood; some therapeutists believing it to act merely as a nutritive agent, valuable from the readiness with which it is assimilated—others attributing its curative powers to an alterative action from the iodine and bromine, or other principles which it contains. Its effects are, however, probably due merely to its nutrient action, in supplying a sufficiency of molecular base for interstitial growth. The biliary principles which it contains promote its absorption and appropriation by the system. The most striking feature of its action on the economy is *increase of weight;* and, usually, where it fails to increase the weight, it is of little service. In *large doses*, cod-liver oil produces nausea and diarrhœa, and these effects occasionally follow the use of medicinal doses.

Medicinal Uses.—Cod-liver oil has long been known as a remedy in rheumatic diseases; and within the last twenty years it has come into extensive use, as an alterative in tuberculous and scrofulous affections. In the treatment of phthisis pulmonalis, it is now looked upon, in Great Britain and the United States, as superior to any other agent, and as possessing an undoubted power of arresting the progress of both the general and the local symptoms in this disease. Over the different forms of scrofula, it exercises also a very decided control—particularly glandular enlargements, ulcers, diseases of the joints

and spine, ophthalmia, &c. In the various cutaneous affections, chronic rheumatism and gout, and the entire circle of chronic disorders, in which there is a tendency to marasmus, cod-liver oil is now employed. Its peculiar powers and merits require, however, to be more fully developed by time. It is contraindicated where there is a tendency to congestion or plethora, and its exhibition should be suspended (temporarily, at least) in the treatment of phthisis, when intra-thoracic inflammation or hemoptysis is present. Its good effects are most conspicuous, in proportion to the youth of the patient.

Administration.—Dose, a tablespoonful two or three times a day, to be gradually increased as the stomach will permit; and it must be persevered with for a long time before its good effects appear. It is best given in some aromatic water, or the froth of porter; and it may be rendered more acceptable to the stomach by combination with one of the mineral acids. The union of the oil with lime-water, just enough to form a soap, often renders it acceptable to delicate stomachs, and it may be flavored with oil of bitter almonds. If it produce diarrhœa, astringents should be administered with it. It is used as a *clyster*, in cases of ascarides and lumbricoides; and, *externally*, in cutaneous affections and opacity of the cornea.

ARSENICI PRÆPARATA—PREPARATIONS OF ARSENIC.

Metallic arsenic is inert, though, when swallowed, it may prove powerfully poisonous, by becoming oxidized and converted into arsenious acid. It is not used in medicine.

Acidum Arseniosum (*Arsenious Acid*), sometimes called *White Arsenic*, *Oxide of Arsenic*, or *Arsenic*, is obtained principally as a secondary product in the roasting of cobalt ores (the arseniurets of cobalt) in Saxony and Bohemia. It is afterwards purified by sublimation; and, when recently prepared, occurs in glassy, colorless, transparent masses, of a vitreous fracture, which gradually become white and opaque,

progressively from the surface inwards. It is sometimes kept in the shops in the form of a fine white powder; but, in this state, it is liable to adulteration with chalk or sulphate of lime, and it should therefore be always purchased in masses. It is volatilizable by heat, has no smell, and little or no taste; is soluble in water (completely so in boiling water, and more readily in either, when *transparent* than opaque), and also in alcohol and oils. Its chemical composition is one equivalent of arsenic and three equivalents of oxygen (AsO_3). *Arsenic acid* is composed of one equivalent of metal and five equivalents of oxygen.

Tests.—Owing to the frequent use of arsenious acid as a poison, a knowledge of the means of detecting its presence is of great importance. In the *solid* state, it may be recognized in the first place by its *volatility;* secondly, when thrown on burning charcoal, it is deoxidized, and gives out the *garlicky odor* of metallic arsenic; and, thirdly, if heated in a glass tube with charcoal or black flux, it sublimes and condenses in the form of a *metallic crust.* In *aqueous solution*, arsenious acid may be detected by the following reagents: *sulphuretted hydrogen*, which produces a *lemon* or *sulphur-yellow* sulphuret of arsenic; *ammoniacal nitrate of silver*, which produces a *canary-yellow* arsenite of silver; and *ammoniacal sulphate of copper*, which produces an *apple* or *grass-green* arsenite of copper. The sulphuret of arsenic may be *reduced*, and made to yield metallic arsenic, if heated with soda-flux or potash-flux. The most delicate test, however, of arsenious acid in solution is that of *nascent hydrogen*, termed *Marsh's test.* When the acid is submitted to the action of nascent hydrogen (evolved by the action of diluted sulphuric acid on zinc), it is deoxidized, and unites with the hydrogen to form arseniuretted hydrogen gas. This gas has a garlicky odor, and is recognized by its burning with a bluish-white flame, which deposits on a plate of glass or porcelain, held over the jet, a black spot or ring, surrounded by a larger white ring of arsenious acid. Another test is that of *Reinsch*, and consists in boiling a solution of the acid with muriatic acid and copper-foil or wire,

when the latter acquires a whitish coating of metallic arsenic. *When arsenious acid is dissolved with liquid organic substances*, it should first be separated from insoluble matters by filtration, and the metallic arsenic may be then obtained by *Reinsch's process;* and the liquid or subliming tests afterwards applied. If the poison be mixed with *solid organic substances*, they should be cut up and boiled with water, acidulated with muriatic acid, and the solution afterwards filtered, and again boiled, &c.

Physiological Effects.—Arsenious acid acts *locally* as an escharotic, by destroying the vitality of the parts to which it is applied. Its effects, when it is taken internally, in *medicinal doses*, are not, at first, very obvious. When continued for some time, it generally produces more or less heat and dryness of the throat and stomach, with nausea, increased secretion from the bowels and kidneys, irritation of the conjunctiva, and a peculiar swelling of the face, termed *œdema arsenicalis;* after the latter symptom appears, the medicine should be suspended. In *too long-continued* or *too large medicinal doses*, arsenious acid sometimes produces a sort of chronic poisoning, characterized by disorder of the digestive apparatus, conjunctivitis, œdema, salivation, a cutaneous eruption, loss of the hair and nails, paralysis, convulsions, and, if its use be persevered in, coma and delirium may result, terminating in death. In *excessive doses*, arsenious acid is a violent poison, usually destroying life by gastro-enteritis, in from one to two or three days. When very large quantities are taken, it sometimes acts on the cerebro-spinal system, producing death by narcotism, in a few hours. Occasionally, gastro-enteric and cerebro-spinal symptoms both occur. A few grains of arsenious acid may prove fatal.

Dissections, in cases of poisoning from this agent, reveal redness (sometimes accompanied with extravasations of blood), ulceration, softening, effusion of lymph, and even gangrene, in the alimentary canal. The blood is often fluid and dark-colored. The absorption of arsenious acid into the system, after its administration, is shown by its presence in the blood, animal tissues, urine, &c.

Antidotes and Treatment in cases of Poisoning.—The evacuation of the contents of the stomach, by the stomach-pump or emetics, should be the first object in these cases. Demulcent drinks are to be also freely given. The HYDRATED SESQUIOXIDE OF IRON should be administered, as soon as it can be procured, in the state of *pulp* or *magma*. It is prepared by the action of an alkaline solution on a sesqui-salt of iron; *solution of ammonia* is directed by the U. S. Pharmacopœia, to be added to a *solution of the tersulphate of iron* (see p. 127). The hydrated sesquioxide of iron is a soft, moist, reddish-brown magma, which acts as an *antidote* to arsenious acid, by forming with it an insoluble, inert, subarseniate of protoxide of iron. The dose is about twelve times the supposed amount of poison taken, and it should be given in the *fresh* and *pulpy* state, as it gradually loses its antidotical virtues when kept. The *saccharated oxide of iron* (see p. 125) has also lately been employed as an antidote, and even the *subcarbonate (sesquioxide) of iron* also acts as an antidote, but this is much less powerful than the pulpy hydrate. *Light magnesia* (which has not been too strongly calcined), and freshly-precipitated *gelatinous magnesia*, may be also used as antidotes. The after treatment consists in the use of demulcents, opiates, and, if necessary, stimulants.

Medicinal Uses.—Arsenious acid is a very valuable alterative remedy, but it must be exhibited with caution. It is employed with the greatest success in the treatment of *malarial affections*, as *intermittent fevers*, especially such as have resisted the use of bark, or frequently reappeared; in *chronic cutaneous affections*, particularly the scaly diseases (lepra, psoriasis, and pityriasis); also in *certain affections of the nervous system*, chorea in particular, over which it exercises a marked control; in chronic rheumatism, in phthisis, and in the tertiary forms of syphilis. As an *external application*, arsenious acid has been applied to indolent sinuses, lupus, onychia maligna, &c., either pure or mixed with several parts of sulphur; its use is, however, attended with danger of constitutional effects. It is an ingredient of various empirical compounds, employed in the treatment of cancer.

Administration.—Dose, gr. $\frac{1}{16}$ to $\frac{1}{12}$, in pills with bread-crumb, three times a day, to be reduced when conjunctivitis appears, and suspended after the establishment of the *œdema arsenicalis;* and, after being taken a fortnight, it should always be intermitted for a day or two. It is less apt to occasion gastric irritability, when given immediately after a meal. The usual and safer form of exhibiting this remedy, is that of solution with potash.

Liquor Potassæ Arsenitis (*Solution of Arsenite of Potassa*), or *Fowler's Solution.* This is prepared by boiling 64 grains of arsenious acid and bicarbonate of potassa, each, in 12 fluidounces of distilled water, adding half a fluidounce of compound spirit of lavender, and afterwards water enough to make the solution measure a pint. It is a transparent liquid, of an alkaline reaction, and has the color, taste, and smell of spirit of lavender. It is a solution of the arsenite of potassa (KO,AsO_3), and is decomposed by the reagents which act upon arsenic, and is *incompatible* with infusions and decoctions of cinchona. Its *effects and uses* are analogous to those of arsenious acid, though some practitioners have denied their therapeutic identity. The *antidote* is the subacetate of the sesquioxide of iron, which renders inert all the salts of the acids of arsenic. Dose, gtt. v to gtt. x, and even gtt. xx, three times a day. Each fluidrachm contains half a grain of arsenious acid. *A solution of arsenite of soda* has also been employed.

Arsenici Iodidum (*Iodide of arsenic*), made by rubbing iodine and arsenic together, is a teriodide, consisting of one eq. of arsenic and three eq. of iodine (AsI_3). It is an orange-red, crystalline, volatilizable solid, wholly soluble in water, and has been used both *internally* and *externally* in skin diseases. Dose, gr. $\frac{1}{8}$, three times a day; for external use, gr. iij to lard ℥j.

Liquor Arsenici et Hydrargyri Iodidi (*Solution of Iodide of Arsenic and Mercury*). This solution, known as *Donovan's Solution*, is prepared by dissolving 35 grains of iodide of arsenic and red iodide of mercury, each, in half a

pint of distilled water. It is considered by some chemists to be merely an aqueous solution of the two iodides; by others, a solution of hydriodates of the oxides of the two metals. It has a pale-yellow color, a slightly styptic taste, and is *incompatible* with the salts of morphia.

Effects and Uses.—This is a highly valuable alterative preparation, in the various forms of papular and scaly cutaneous affections, and in obstinate syphilis. It was introduced by Mr. Donovan, of Dublin, in 1839, and has been a good deal employed in the United States. Dose, gtt. v to gtt. xx or more, three times a day.

CALCIS PHOSPHAS PRÆCIPITATA—PRECIPITATED PHOSPHATE OF LIME.

This salt is made by reacting upon bone-ash with muriatic acid, which dissolves the phosphate of lime in the bones, and gives it up again, on the addition of ammonia. It is a white, inodorous, tasteless, insoluble powder sometimes called the *bone phosphate of lime* ($3CaO,PO_5$). It has been, for some years past, employed in connection with other phosphates, as those of iron, soda, and potassa, in scrofula and phthisis, under a theoretical view that there is a deficiency of phosphorus in the system in these diseases. An ample supply of the phosphates is, however, derived from the food, although they may prove useful medicinally, from other causes. Dose, ten to thirty grains.

AMMONIÆ MURIAS—MURIATE OF AMMONIA.

This salt, commonly termed *sal ammoniac*, is obtained from the *gas-liquor* of coal gas works, and also in the preparation of animal charcoal from bones. It is brought in the *crude* state from Calcutta to England, where it is *refined* and exported. It occurs in white, translucent, tough, fibrous, hemispherical, convex-concave cakes, about two inches thick, difficult to

powder, inodorous, of a pungent, saline taste, slightly deliquescent, very soluble in water, and less so in alcohol. It consists of one eq. of muriatic acid and one of ammonia, (NH_3,HCl) and is considered by some chemists to be a chloride of ammonium (NH_4Cl).

Effects and Uses.—The local action of muriate of ammonia is that of an irritant. In large doses it purges. In small doses, after absorption, it proves a powerful resolvent alterative, with a slight sedative action on the vascular system, and an increased flow of the secretions generally. It is not much employed in Great Britain or the United States, but it is extensively used in Germany—as a refrigerant sedative in mild fevers attended with stoppage of the secretions—as a resolvent in organic enlargements—in amenorrhœa—and in catarrhs, urethritis, &c. Of late, this salt has been used with advantage in muscular rheumatism and in neuralgia; and its resolvent powers are highly spoken of in fibroid tumors of the uterus. Dose, gr. v–xxx, every two or three hours, in powder or mucilaginous solution. *Externally*, it is used in solution (immediately upon being dissolved), as a refrigerant lotion (℥i to half a pint of water), in cutaneous affections and indolent ulcers (℥i to half a pint of water), and also as a discutient.

AMMONIÆ PHOSPHAS—PHOSPHATE OF AMMONIA.

Although not officinal, this salt enjoys considerable reputation as an alterative. It is made by adding Stronger Solution of Ammonia to Diluted Phosphoric Acid, evaporating and crystallizing. It occurs in transparent colorless crystals, having the form of six-sided tables, of an alkaline, somewhat saline taste, soluble in water and insoluble in alcohol. As usually found in the shops, it is a mixture of the neutral and of the acid phosphate of ammonia.

Effects and Uses.—It has been used in this country as a remedy in gout and rheumatism, and is highly esteemed. In

combination with carbonate of ammonia and aromatic spirit of ammonia, it has been also lately used with advantage in diabetes. Dose, ten to forty grains, three or four times a day, dissolved in an aromatic water.

POTASSÆ CHLORAS—CHLORATE OF POTASSA.

This salt is prepared by various processes: a good one is by reacting upon solution of caustic potassa, mixed with lime, with a stream of chlorine—the chlorine is converted into chloric acid by oxygen from the lime, and the acid combines with the potassa to form chlorate of potassa (KO,ClO_5). It is a white anhydrous salt, crystallizing in rhomboidal plates of a pearly lustre, and is inodorous, and of a cool, saline taste. It is but little changed by exposure to the air, soluble in cold water, highly so in boiling water. It is said to be soluble in all the animal fluids without decomposing them, or undergoing change itself.

Effects and Uses.—Chlorate of potassa, when taken internally, gives a bright arterial tinge to the venous blood, reduces the volume and frequency of the pulse, and largely increases the secretion of urine, by which it passes out of the system unchanged. The appetite is improved under its use, and salivation is an occasional effect. Large doses may be taken with impunity, but excessive quantities have produced fatal gastro-enteric inflammation. As it contains a large supply of oxygen, it was at first employed, with a view to its oxidizing influence in contaminated conditions of the blood, as in malignant fevers, syphilis, &c.; and, whatever the modus medendi, it is still considered a valuable alterative in typhus, scarlatina, &c. Probably, its most positive remedial effects are seen in various forms of stomatitis, follicular, mercurial, and gangrenous. It is also used in diphtheria, croup, cyanosis, asthma, and even neuralgia. *Externally*, in solution, it is an admirable wash or gargle in stomatitis, ozœna, the sore throat of scarlatina, diphtheria, and fetid ulcerated surfaces generally. Dose, *internally*,

fifteen to thirty grains, every three or four hours, in some pleasant vehicle. For *external* use, ʒij–iv may be dissolved in half a pint of water.

POTASSÆ BICHROMAS—BICHROMATE OF POTASSA.

This salt is obtained from the yellow chromate of potassa, by acidulating its solution with sulphuric acid, which abstracts an eq. of potassa from two eq. of the neutral salt, and thus generates the bichromate ($KO,2CrO_3$); it separates in orange-red crystals, soluble in water, insoluble in alcohol, and of a cooling, bitter taste.

Effects and Uses.—It is an irritant caustic, acting in over-doses as a corrosive poison, for which the proper antidotes are magnesia, soap, and the alkaline carbonates. In small doses, it is alterative, and has been used in syphilis, with encouraging results. In larger doses, it is emetic. Externally, it is a good application, in powder, or in saturated solution, to syphilitic warts, excrescences, &c. Dose, as an *alterative*, gr. $\frac{1}{5}$ daily, in pill, with some bitter extract; as an *emetic*, gr. $\frac{3}{4}$.

POTASSÆ PERMANGANAS—PERMANGANATE OF POTASSA.

This salt is made by heating together the black or binoxide of manganese with caustic potassa; the binoxide is converted into manganic acid, and afterwards into permanganic acid, which combines with the potassa to produce permanganate (KO,Mn_2O_7). It occurs in the form of slender prismatic crystals, of a dark purple color, inodorous and of a sweetish astringent taste. It dissolves readily in water, making a beautiful lilac solution.

Effects and Uses.—There is little experience, as regards the action of this salt, when administered internally, although alterative effects are attributed to it (and probably with reason), in poisoned conditions of the blood, as in malignant

fevers, diphtheria, &c, It is as a powerful *disinfectant*, that it at present claims chief attention, and it now ranks at the head of this class of agents, in destroying fetid odors, and poisonous organic emanations. It is used externally, in dressing foul and fetid or gangrenous ulcers, particularly in hospital gangrene, as an application to carbuncles, as a gargle in diphtheria, &c. It may be sprinkled in powder on gangrenous surfaces, or applied in solution, of the strength of half an ounce, an ounce, or two ounces to a pint of water. As a *disinfectant*, a solution of from one to ten grains to an ounce of water, may be exposed in saucers, or sprinkled on the floor, or thrown into the air in spray by the atomizer. One to three grains may be given *internally* in solution, through the day.

AQUA CHLORINII—CHLORINE WATER.

This is an aqueous solution of *chlorine*, which is generated by heating 3 troyounces of muriatic acid, diluted with 2 fluidounces of water, with half a troyounce of black oxide of manganese. The chlorine is conducted by suitable tubes, through 2 fluidounces of water, into a bottle containing 20 fluidounces of distilled water, with which it is agitated, and the *chlorine water* is afterwards transferred to a well-stoppered bottle, made impervious to light. It does not keep well. It occurs as a pale, yellowish-green liquid, having an astringent taste and the peculiar odor of the gas. Its employment internally is chiefly in essential malignant fevers, as scarlatina and typhus, also in syphilis and diseases of the liver. Dose, f℥i–iv, diluted. Externally, it is used, diluted, as a wash in skin diseases, as an antiseptic, and by inhalation in bronchial affections. In case of poisoning by chlorine, albumen is the best antidote.

CALX CHLORINATA—CHLORINATED LIME.

This preparation, often called *chloride of lime* (CaO,Cl), is prepared by passing chlorine over lime, till saturation is

effected, and occurs as a loose, grayish-white powder, readily soluble in water, of a bitter, caustic taste, and a faint odor of chlorine. It has been used as an alterative, in typhus, malignant scarlatina, syphilis, &c., in doses of from one to five grains, in solution, several times a day; and as a wash, *externally*, one part dissolved in a hundred parts of water—or as a paste. It is chiefly, however, as a *disinfectant* that it is employed. Its effects are essentially those of chlorine, like which it decomposes hydrosulphuric and hydrocyanic acids, and should not be given with mercurials.

Liquor Sodæ Chlorinatæ (*Solution of Chlorinated Soda*) (NaO,Cl), sometimes termed *Labarraque's disinfecting liquid*, is made by decomposing a solution of carbonate of soda by one of chlorinated lime. It is a transparent, greenish-yellow liquid, with a faint smell of chlorine, a sharp saline taste, and an alkaline reaction. It has been used *internally*, to fulfil the same indications as chlorinated lime, in doses of thirty drops to a teaspoonful, diluted, several times a day. It is useful also, in dilution of various strengths, as an *external* application to every form of fetid ulcer, and it is a most valuable and powerful *disinfectant*.

Peroxide of Hydrogen (HO_2), has lately been added to our list of alteratives. It may be prepared in numerous ways, the only practically useful ones being based upon the decomposition of peroxide of barium by means of an acid in presence of water. The most satisfactory method is to pass a rapid current of pure carbonic acid through distilled water, peroxide of barium being added in small quantities, care being taken to have the acid always in excess. After filtration, the solution is concentrated under the receiver of an air-pump. It is (in the form of a concentrated aqueous solution) a colorless, transparent liquid, less volatile than water, of a bitter taste, having a sp. gr. 1.452, and is incompatible with many substances, as all vegetable tinctures, the citrates and tartrates of the alkalies and of iron, hydrocyanic acid, sulphate, chloride, and nitrate salts, &c.

Peroxide of hydrogen is an active oxidizing agent, and has been found highly efficacious in diabetes, in the dyspnœa of cardiac and pulmonic diseases, in promoting the blood-action of iron, and its use has also been suggested as an anti-syphilitic remedy, in gout, and in epilepsy and other diseases of irritable action of the nerve-centres. The strength of the solution should be such that the peroxide on decomposition should yield a volume of oxygen ten times as great as the volume of the solvent: dose, one to four fluidrachms three times a day.

Locally, it has been applied with advantage to ill-conditioned ulcers. Under the name of *Ozonic Ether*, a solution of peroxide of hydrogen in ether has been used successfully in diabetes, in doses of from ten to thirty minims, up to a drachm. It is also employed in the form of spray, as a disinfectant, and as an application to ulcerated, fetid, or sloughing surfaces; and it has been inhaled with advantage to relieve the cough of phthisis.

ORDER III.—ANTACIDS.

Antacids are medicinal agents, employed to neutralize acids in the blood, primæ viæ, and secretions. The alkalies and alkaline earths, and their carbonates, are the substances included in this division. The alkalies, in the concentrated state, destroy organization and act as corrosive poisons; they are administered internally only in a state of extreme dilution. The alkaline carbonates produce a less intense chemical action on the tissues than the alkalies; and the bicarbonates are less active than the monocarbonates. The alkaline earths, particularly magnesia, are less energetic in their local action than the alkalies proper; and their carbonates manifest little or no chemical influence over the tissues.

When swallowed in a state of dilution, the *alkaline preparations* combine with the free acids which they encounter in the stomach. The salts which are thus formed, unless carried off by the bowels, are absorbed into the blood, and are thrown out

by the secretions, especially by the kidneys. While in the stomach, besides neutralizing acids, the alkalies also promote the digestion and absorption of fatty substances, by forming with them an emulsion. After absorption, they exert a liquefacient action on the blood, and render the urine alkaline. Their long-continued use disorders the functions of digestion and nutrition, produces a chronic deterioration of the blood, and sets up a cachetic condition somewhat analogous to scurvy.

In the *concentrated* form, the alkalies are employed as *escharotics*. The various alkaline preparations are administered *internally*, in the diluted form: 1. As *antacids*, in dyspepsia, accompanied with excess of acid in the primæ viæ, and they are probably also of advantage, in dyspeptic cases, by promoting the digestion of fatty matters. The neutralization of acid, in dyspepsia, by the alkaline preparations, is chiefly *palliative;* although their continued use often diminishes temporarily the tendency to acid secretion. The vegetable tonics and aromatics are frequently combined with antacids, very advantageously, in the treatment of dyspepsia. 2. As *antidotes*, in cases of poisoning from acids. 3. As *antilithics*, to neutralize lithic acid, when it is separated in undue quantity by the urine; and, also, as *lithontriptics*, or solvents of calculi, especially lithates. They are improper when there is a tendency to the deposition of phosphates. 4. In the treatment of acute rheumatism and gout, where they act by neutralizing the excess of acid, with which the blood is charged in these diseases. 5. To relieve irritability of the urinary organs—ardor urinæ in gonorrhœa—cutaneous irritation—uterine irritation—pruritus ani, &c.,—when these conditions of irritability are dependent, as is often the case, on excess of acid in the system. 6. As *diuretics* (see p. 245). 7. As *antiplastics* and *resolvents*, in inflammation.

The antacid preparations should be administered in a state of large dilution, with a view to facilitate their absorption, and to prevent an irritant and purgative action on the bowels.

POTASSÆ PRÆPARATA—PREPARATIONS OF POTASSA.

The preparations of potassa, employed as antacids, are the *Solution of Potassa*, *Carbonate of Potassa*, and *Bicarbonate of Potassa*. Besides their antacid, antiplastic, and diuretic uses, the salts of potassa have been administered therapeutically in the treatment of *scurvy*. This employment of them is based upon the opinion, that scurvy is the result of a deficiency of potash in the food; and that by the exhibition of some saline preparation of these alkalies, the necessary alimentary ingredient is restored.

Liquor Potassæ (*Solution of Potassa*), is prepared by the action of lime on a solution of bicarbonate of potassa; the lime abstracts carbonic acid from the carbonate, and precipitates as carbonate of lime, leaving the free potassa in solution; or it may be made, more directly, by dissolving a troyounce of potassa in a pint of distilled water. Solution of potassa is a limpid, colorless liquid, without smell, of an acrid, caustic taste, and an alkaline reaction.

Effects and Uses.—The antacid, diuretic, antilithic, and resolvent properties and indications of this preparation have been described above. It is more irritant to the stomach than the carbonates of potassa, and is therefore less eligible for protracted use. In excessive quantity, it may act as an irritant and corrosive poison; oils and vegetable acids should be administered as antidotes. Dose, gtt. x–xx, largely diluted with sweetened water or mucilage. *Externally*, it is used, in a diluted state, as a stimulant lotion.

Potassæ Carbonas (*Carbonate of Potassa*). This salt, as usually kept in the shops, is prepared by the purification of the impure carbonate of potassa, known as *pearlash*, which is obtained from wood-ashes, by lixiviation. Carbonate of potassa occurs in the form of a white, coarse, granular powder, of a nauseous, alkaline taste, and an alkaline reaction,—very soluble in water, but insoluble in alcohol. It is very deliquescent, forming, if long exposed to the air, an oily liquid with the

water which it attracts. It consists of one equivalent of carbonic acid, one of potassa (KO,CO_2), and two or three equivalents of water. Acids, acidulous salts, and many other substances are incompatible with it. It is employed as an antacid, diuretic, antilithic, &c., in the dose of gr. x–xx, in some sweetened aromatic water. In large quantities, it acts as a corrosive poison, for which oils and vegetable acids are the antidotes.

As the *purified pearlash* of the shops is always more or less impure, a better salt for internal use is—

Potassæ Carbonas Pura (*Pure Carbonate of Potassa*), commonly called *Salt of Tartar*, from its having been formerly obtained from cream of tartar. It is now made by calcining bicarbonate of potassa, which is thus deprived of its water of crystallization and an equivalent of carbonic acid, and is reduced to the state of carbonate. It differs from *purified pearlash* only in containing no impurities.

Potassæ Bicarbonas (*Bicarbonate of Potassa*), is made by passing carbonic acid through an aqueous solution of carbonate of potassa, till it is fully saturated. By filtration and evaporation, it is obtained in transparent, colorless crystals, having the shape of irregular eight-sided prisms with two-sided summits. They are inodorous, of a slight alkaline taste, permanent in the air, soluble in water, insoluble in alcohol, and consist of two equivalents of carbonic acid, one of potassa ($KO,2CO_2$), and one of water. The *effects and uses* of this salt are the same as those of the carbonate, but it is pleasanter in taste and less irritant to the stomach. Dose, ℈j to ʒj. In acute rheumatism, this dose may be repeated every hour or two.

Sodæ Præparata—Preparations of Soda.

Liquor Sodæ (*Solution of Soda*), is prepared by the action of lime on a solution of carbonate of soda. Its properties are the same as those of solution of potassa.

The only preparations of soda, generally employed as antacids, are the *carbonates*. There are several sources of carbonated soda. The native carbonate (called *natron*), is found in Egypt, Hungary, and other countries. Impure soda, obtained from the ashes of marine plants, is termed *barilla* or *kelp*,—barilla, when it is derived from phenogamous plants growing near the sea, and kelp, when procured from cryptogamic plants growing in the sea. Carbonate of soda is now, however, chiefly made by artificial means, from sulphate of soda, which is obtained in part from the manufacturers of chlorinated lime, but principally by the action of sulphuric acid on chloride of sodium. The sulphate of soda is fused with ground limestone and coal, and forms a black mass called *British barilla*, which consists of a mixture of oxysulphuret of calcium, caustic lime, and coaly matter, with carbonate of soda. It is afterwards purified by lixiviation, calcination, and other processes. By another process, artificial soda is made by decomposing the sulphate with sesquioxide of iron and coal. Within a few years past, caustic soda and the carbonates and other salts of soda have been manufactured near Pittsburg, in Pennsylvania, from *cryolite* (a fluoride of sodium and aluminum), which is found in an immense deposit in Greenland, and largely imported into Philadelphia. Soda is obtained from cryolite by mixing it with lime and subjecting it to heat; the fluorine combines with the calcium, forming fluoride of calcium, while the remaining metals absorb oxygen from the air, and become alumina and soda, carbonic acid being afterwards passed through the solution, to form carbonate of soda, the insoluble alumina being deposited.

Sodæ Carbonas (*Carbonate of Soda*), crystallizes in large, oblique, rhombic prisms, which are transparent, very efflorescent, of an alkaline, disagreeable taste, soluble in water, but insoluble in alcohol. When heated, they undergo the watery fusion, and part with their water of crystallization, which is entirely expelled at a red heat. The chemical composition of the salt is one equivalent of carbonic acid and one of soda (NaO,CO_2); and perfect crystals have ten equivalents of water

of crystallization. It is apt to contain sulphate of soda and common salt as impurities. Acids, acidulous salts, lime-water, earthy and metallic salts, &c., are incompatible with carbonate of soda.

Effects and Uses.—Carbonate of soda is less irritant, and has a milder and more agreeable taste, than carbonate of potash. Its effects are otherwise similar, and it is administered in the same cases. In overdoses, it is a corrosive poison, for which oils and acids are the *antidotes*. Dose, gr. x to ʒss, in powder, or dissolved in some bitter infusion. Owing to the variable quantity of water of crystallization which it contains, as kept in the shops, it is best given in the *dried* state.

Sodæ Carbonas Exsiccata (*Dried Carbonate of Soda*). This salt is deprived of its water of crystallization by heat, and occurs in the form of a white powder. Dose, gr. v–xv, in pill, made with soap and aromatics.

Sodæ Bicarbonas (*Bicarbonate of Soda*), is prepared by saturating the carbonate with carbonic acid. In the process followed in this country, the water contained in the carbonate, which is liberated during the progress of its saturation, is drained off. Thus obtained, the crystals have the form of the carbonate, but are opaque and porous. They usually occur in granular masses, of a snow-white color, which are found in the shops in the form of powder. It is a permanent salt, of a slightly alkaline taste, and consists of two eq. of carbonic acid, one of soda, ($NaO,2CO_2$), and one of water. By exposure to heat, it gradually parts with its carbonic acid, and at a red heat is converted into the anhydrous carbonate.

The *effects and uses* of this salt are the same as those of the carbonate, but it is less irritant and of a more agreeable taste. When administered as an antilithic, it is said to be less liable than the carbonate to induce phosphatic deposits. It has been used as a liquefacient, in infantile croup, in the dose of gr. j, every five minutes, to promote the expulsion of false membrane. Dose, for an adult, gr. x to ʒss, which may be pleasantly taken in carbonic acid water, or made into *lozenges* with sugar and mucilage of tragacanth. *Soda Powders* consist of tartaric acid

(gr. xxv) in one paper, and bicarbonate of soda (gr. xxx) in another. They are dissolved in separate portions of water, to the amount of half a pint in all, and, when mixed, form a pleasant *effervescing* draught. Bicarbonate of soda is an ingredient also of *Seidlitz Powders* (see p. 221). *Troches* of bicarbonate of soda are made by mixing 4 troyounces of bicarbonate of soda with 12 troyounces of sugar, and making a mass with mucilage of tragacanth, to be divided into troches, each weighing 10 grains.

LITHIÆ PRÆPARATA—PREPARATIONS OF LITHIA.

Lithia is a rare alkali, found in a few minerals. The CARBONATE (*lithiæ carbonas*) is prepared from lepidolite, or from sulphate of lithia or chloride of lithium, by adding carbonate of ammonia. It is a white powder, of a mild alkaline taste, soluble in 100 parts of water, more soluble in carbonic acid water, and insoluble in alcohol. It consists of one eq. of lithia and one of carbonic acid (LO,CO_2).

It is a very valuable antacid in gout, from the fact of its low combining number, and the great solubility of the urate of lithia, thus enabling the carbonate to act powerfully in eliminating uric acid from the system. It is also a good diuretic. Dose, three to five grains, best given in carbonic acid water.

LITHIÆ CITRAS (*Citrate of Lithia*) ($3LO,C_{12}H_5O_{11}$), a deliquescent white powder, is made by adding a solution of citric acid to the carbonate of lithia. It is converted into a carbonate in the system, and is, therefore, possessed of the same properties.

AMMONIÆ PRÆPARATA—PREPARATIONS OF AMMONIA.

The preparations of ammonia (previously noticed under the head of *Stimulants*, p. 167), are administered as *antacids*, in cases in which a *stimulant* action is not objectionable. *Spiritus*

Ammoniæ Aromaticus (*Aromatic Spirit of Ammonia*), is the preparation usually employed, and is an excellent antacid carminative in heartburn, attended with flatulence, nausea with syncope, &c. Dose, gtt. xxx–f℥j.

MAGNESIÆ PRÆPARATA—PREPARATIONS OF MAGNESIA.

Magnesia (p. 215), and its *Carbonate* (p. 216), are employed as antacids in dyspepsia, sick-headache, gravel, &c., particularly where a laxative effect is also desirable. Dose, gr. x–xxx. *Troches of Magnesia* are made by mixing 4 troyounces of magnesia, 60 grains of nutmeg, and 12 troyounces of sugar, and forming with mucilage of tragacanth a mass, to be divided into troches, weighing 10 grains each.

CALCIS PRÆPARATA—PREPARATIONS OF LIME.

The preparations of lime, employed as antacids, are *Lime-water*, *Precipitated Carbonate of Lime*, *Prepared Chalk*, and *Prepared Oyster-shell*. They are very useful in cases of acidity or irritability of the stomach, but their action on the bowels is the reverse of that of magnesia, and hence they can hardly be administered where there is a tendency to constipation. They are also much employed in diarrhœa, and occasionally as alterative resolvents in glandular enlargements, as antispasmodics in nervous disorders, and to relieve irritability of the bladder from calculus.

Liquor Calcis (*Solution of Lime—Lime-water*), is a saturated solution of lime (four troyounces) in distilled, river, or rain water (eight pints). It is a colorless, inodorous liquid, of a disagreeable alkaline taste. By exposure to the air it gradually absorbs carbonic acid, with the formation of insoluble carbonate of lime. It should, therefore, be kept in full, well-stoppered bottles, or they should contain some undissolved lime.

Effects and Uses.—Lime-water combines antacid and astrin-

gent properties, and is applicable to all the cases in which antacids are proper, where an astringent effect on the bowels is not objectionable. It is an excellent remedy in gastric irritability, attended with nausea and vomiting, and may be given mixed with an equal part of milk, which disguises its unpleasant taste. A diet of milk and lime-water is very useful in dyspepsia, accompanied with vomiting of food. Lime-water is employed also in diarrhœa, after inflammation has been subdued, in diabetes, and as an alterative resolvent in glandular affections. *Externally*, it is used as a wash in tinea capitis, prurigo, scabies, &c., as an application to foul ulcers, and as an injection in leucorrhœa and gleet; atomized inhalations of lime-water have been found useful in diphtheria. Dose, internally, f℥ss to f℥iij–iv, several times a day; for children, f℥j. *Linimentum Calcis* (eight fluidounces of lime-water, mixed with seven troyounces of flaxseed oil, sometimes called Carron oil), is an invaluable liniment in burns and scalds, and in small-pox.

Calcis Carbonas Præcipitata (*Precipitated Carbonate of Lime*, (CaO,CO_2), is made by mixing boiling solutions of chloride of calcium and carbonate of soda. It is a fine white powder, insoluble in water, and free from grittiness, but possessing no superiority over *prepared chalk*.

Creta Præparata (*Prepared Chalk*), is made from *chalk* or *whiting*, by levigation and elutriation. It occurs in little white conical loaves, which are tasteless, odorless, insoluble in water, but more soluble in carbonic acid water. It consists of one eq. of carbonic acid and one of lime (CaO,CO_2). Its *effects* are those of an absorbent, antacid, and desiccant astringent. It is *used* in dyspepsia and gout, attended with an excess of acid in the system; also in diarrhœa; and, as it forms soluble salts of lime with the acids of the stomach, its employment has been suggested in rachitis. Dose, gr. x–xxx, in powder, or suspended in water with gum and sugar. *Mistura Cretæ* (*Chalk Mixture*), consists of chalk (half a troyounce), rubbed up with sugar and gum arabic (each ℥ij), and water and cinnamon-water (each f℥iv); dose, f℥ss, repeated. Laudanum and tincture of kino or of catechu are often added to this mixture, in the

treatment of diarrhœa. *Troches of chalk* are made by mixing 4 troyounces of prepared chalk, a troyounce of gum arabic, 60 grains of nutmeg, and 6 troyounces of sugar, and forming with water a mass, to be divided into troches, each weighing 10 grains.

Testa Præparata (*Prepared Oyster-shell*), differs from prepared chalk, in containing animal matter united with the carbonate of lime, and is thought to be more acceptable to a delicate stomach. Dose, gr. x–xxx.

CLASS IV.—TOPICAL MEDICINES.

ORDER I.—IRRITANTS.

Irritants are medicines which are employed to produce irritation or inflammation of the parts to which they are applied. They may be subdivided into Rubefacients, Epispastics, Suppurants, and Escharotics. *Rubefacients* are used merely to produce redness of the skin. *Epispastics*, or *vesicants*, cause the exhalation of a serous fluid under the cuticle. *Suppurants* produce a crop of pustules. *Escharotics* have a chemical action on the tissues with which they are placed in contact, and decompose or destroy them.

RUBEFACIENTS.

Rubefacients are employed to remove congestion and inflammation, to rouse the capillary system in cases of local torpor, to relieve pain and spasm, and as stimulants to the general system, in coma, syncope, asphyxia, &c. They are adapted to cases in which a sudden and powerful but transient action is called for; but they may also be employed where a slight and long-continued action is desired. In removing congestion and inflammation, rubefacients act by *revulsion*. They are chiefly useful in the forming stages or in light grades of inflammation. They are very serviceable local anodynes, when applied to

painful parts—acting by a *substitutive* influence. As general stimulants, their efficacy in rousing the system depends partly on their action on the capillary circulation, and partly on the pain which they produce. They are most valuable in the coma or asphyxia resulting from poisons, drowning, &c., and are inferior to blisters in the cerebral oppression, which occurs in fevers, inflammations of the brain, &c.

Rubefacients are usually applied till pain and redness supervene. If kept too long on the skin, many of them will produce vesication and even gangrene; and, in cases of coma, particular caution is required, as the patient may not feel them till dangerous inflammation has occurred.

SINAPIS—MUSTARD.

Mustard-seeds are obtained from two varieties of Sinapis,—S. nigra, or Black Mustard, and S. alba, or White Mustard (*Nat. Ord.* Brassicaceæ), small annual European plants, cultivated in our gardens. S. nigra has become naturalized in some parts of the United States. *Black mustard-seeds* are small, globular, of a deep-brown color externally, and internally yellow. They are inodorous, except in powder; and, when rubbed with water, exhale a very strong, pungent smell. Their taste is bitterish, hot, and pungent. *White mustard-seeds* are larger, yellowish externally, and of a less pungent taste, owing to the presence of a mucilaginous substance in their skin. The *powder* of both varieties (commonly called *flour of mustard*), is yellow, and is often adulterated with colored wheaten flour. Both varieties yield their virtues wholly to *water*, and very slightly to alcohol.

Chemical Constituents.—Mustard-seeds yield, upon pressure, a fixed oil, which contains a peculiar acid, termed *erucic*. From the *black seeds* a very pungent *volatile oil*, containing sulphur, is afterwards obtained by distillation: *it does not pre-exist in the seeds, but is the result of the action of water upon a peculiar principle called sinapisin.* It is colorless or pale yel-

low, rather heavier than water, of a very pungent odor, and an acrid, burning taste, and is the principle to which the black seeds owe their activity. From the *white seeds* no volatile oil is obtained; but, when treated with water, they yield an *acrid fixed principle*, which is analogous in properties to the volatile oil of the black seeds. *It is the result of the reaction of water upon sulpho-sinapisin*, a peculiar ingredient of the white seeds. The development of the volatile oil in the black seeds, and of the acrid fixed principle in the white seeds, is supposed to depend upon the presence of an albuminous constituent, called *myrosyne*, which acts the part of a ferment in determining a reaction between water and the peculiar principles of the seeds. Myrosyne is rendered inert by heat, alcohol and the acids; and water of the ordinary temperature is therefore the proper menstruum of mustard.

Effects and Uses.—Mustard is an acrid stimulant. In small quantities it is stomachic; in larger doses, it proves emetic; and, in excessive doses, it will produce gastro-enteric inflammation. When applied to the skin, it is a rapid and powerful local excitant, speedily producing redness and pain, and, if long continued, it will develop vesication, ulceration, and even sphacelus. Mustard-seeds, swallowed whole, have been used as a laxative in dyspepsia, in the dose of a tablespoonful once or twice a day, mixed with molasses; the white seeds are preferred. When mustard is employed *internally*, however, it is chiefly as an emetic, in cases of torpor of the stomach, particularly after narcotic poisoning; and, by its stimulant action, mustard often rouses the gastric susceptibility when other emetics fail. Dose, as an emetic, from a large teaspoonful to a tablespoonful of the bruised seeds or powder. Its use in smaller quantity, as a condiment and stimulant of the digestive organs, is well known. In the form of *whey* (half a troyounce boiled in milk Oj), it is given as a diuretic in dropsy. The most general use of mustard is, however, as a cutaneous stimulant, in the form of *cataplasm* (termed a *sinapism*). This is made by mixing flour of mustard with a sufficient quantity of tepid water to give it proper consistence; and it may be diluted with wheat or rye flour, if a

weaker effect is desired. Sinapisms are used, when a speedy and powerful rubefacient effect is required: they should be kept on till pain and redness are produced, usually from a quarter of an hour to an hour, and, in cases of insensibility, their effects should be carefully watched. They are applied spread on linen, and covered with gauze, to prevent adhesion to the skin.

CAPSICUM.

Capsicum has been previously noticed as an *aromatic stimulant* (p. 171). It is a powerful rubefacient, useful in rheumatism, low fevers, &c., and is applied in the form of cataplasm, or the tincture or oleoresin may be used.

OLEUM TEREBINTHINÆ—OIL OF TURPENTINE.

The oil of turpentine (see pp. 175, 261), is a speedy and efficacious rubefacient, and sometimes produces a vesicular eruption. It is employed in low forms of disease, attended with coldness of the surface; as a counter-irritant in inflammation; and as a stimulating liniment in rheumatic and paralytic cases. It is often diluted with olive oil.

LINIMENTUM AMMONIÆ—LINIMENT OF AMMONIA.

This preparation, called also *volatile liniment*, consists of one fluidounce of *water of ammonia* (see p. 168), and two troyounces of olive oil. It is an excellent application, as a counter-irritant, in affections of the throat and chest, &c.

PIX BURGUNDICA—BURGUNDY PITCH.

This is the prepared CONCRETE JUICE of Abies excelsa or Norway Spruce (*Nat. Ord.* Pinaceæ), a lofty evergreen tree of Europe and Northern Asia. Abies picea, or the European Silver Fir, is said to be also a source of the drug. It is ob-

tained by stripping off the bark, and detaching the flakes of resinous matter which form upon the surface of the wound; they are afterwards melted in boiling water and strained. Burgundy pitch is principally collected in France, and derives its name from Burgundy, in that kingdom. After it is imported into the United States, it is generally remelted and strained, to free it from impurities; and, as found in the shops, it is a hard, brittle, opaque substance, of a yellowish or brownish-yellow color, and a weak terebinthinate taste and smell; when applied to the body, it softens and becomes adhesive. It contains two resins, and a much smaller proportion of volatile oil than turpentine.

A *spurious Burgundy pitch* is made by melting together pitch, resin, and turpentine, and agitating the mixture with water.

Effects and Uses.—This is a gentle rubefacient, producing a slight degree of inflammation and serous effusion, without separating the cuticle. It occasionally produces a papillary or vesicular eruption; and, sometimes, though rarely, occasions painful vesication and even ulceration. It is applied, in the form of *plaster*, to the chest in chronic pulmonary disorders, to the loins in lumbago, to the joints in chronic articular affections, and for the relief of local rheumatic pains in other parts.

Emplastrum Picis Burgundicæ, (*Burgundy Pitch Plaster*), consists of twelve parts of Burgundy pitch, melted with one part of yellow wax, which is used to give consistence to the pitch. *Emplastrum Picis cum Cantharide* (*Plaster of Pitch with Cantharides*), consists of twelve parts of Burgundy pitch, melted with one part of cerate of cantharides; this is commonly called the *warming plaster*, and is a more active rubefacient than Burgundy pitch, though it does not usually blister. The *Plaster of Antimony*, *Plaster of Iron*, *Compound Galbanum Plaster*, and *Opium Plaster*, all contain Burgundy pitch.

PIX CANADENSIS—CANADA PITCH.

This is the prepared CONCRETE JUICE of Abies Canadensis, or Hemlock Spruce (*Nat. Ord.* Pinaceæ), a very lofty evergreen tree of Canada and the northern parts of the United States. The pitch, (sometimes called *hemlock gum*), is a spontaneous exudation on the old trees. The portions of bark upon which it hardens are stripped from the tree and boiled, and the melted pitch is skimmed from the surface of the water. It undergoes a further purification in the shops, by melting and straining, and is found in hard, brittle, opaque masses, of a dark yellowish-brown color, a weak, peculiar odor, and scarcely any taste. It is more readily softened by heat than Burgundy pitch, and is therefore sometimes a less convenient application. Its constituents are resin, and a minute portion of volatile oil. Its *effects* and *uses* are the same as those of Burgundy pitch.

Emplastrum Picis Canadensis (*Plaster of Canada Pitch*), sometimes called *Hemlock Pitch Plaster*, consists of twelve parts of Canada pitch, melted with one part of yellow wax.

Many other acrid substances are occasionally employed as *rubefacients*. GINGER (see p. 176), BLACK PEPPER (see p. 172), and GARLIC (see p. 259), are particularly deserving of mention.

EPISPASTICS.

Epispastics, called also *vesicants* and *blisters*, are medicines which, when applied to the skin, produce inflammation, accompanied by effusion of serum beneath the cuticle. Many of the rubefacients will blister, if kept on the skin a sufficient length of time; and, on the other hand, the action of vesicants may be made not to extend beyond rubefaction. The inflammation of the skin, caused by vesicants, is erysipelatous in its character, and may result in suppuration and even sloughing or gangrene. In inflammations of the dermoid tissues, as

rubeola and scarlatina, in typhus under certain circumstances, and in extreme infancy,—vesicants may produce fatal consequences.

This class of agents is employed: 1. As *derivatives* or *revellents*, for the relief of internal inflammations. By determining the circulating fluid and the nervous energy to the seat of their action, vesicants exert a powerful influence in the cure of distant inflammations. They are objectionable in the early stages of acute inflammation, before febrile action has been subdued, as they may excite the vascular system, and thus increase the inflammation of the affected organ. As regards the proper situation for applying vesicants, different theoretical opinions have been advanced; but experience has shown that for the relief of internal inflammation, they cannot be applied too near the affected organ. In affections of the head, blisters are preeminently useful. 2. To substitute a healthy therapeutic inflammatory action, which subsides spontaneously, for a morbid action existing in the part to which they are applied. In this way vesicants are used for the cure of various cutaneous eruptions. 3. To relieve pain, which they do partly by a derivative, and partly by a substitutive influence. 4. To break up morbid associations, by the powerful impression which they make on the nervous system, as in the cure of intermittent fever, spasmodic diseases, &c. 5. To stimulate the absorbing or secreting vessels of parts contiguous to the seat of their application; in this way, they are useful in promoting the absorption of dropsical effusions, in the treatment of ununited fracture, &c. 6. As general stimulants, in typhoid conditions of the system, coma, syncope, &c. 7. As local stimulants, in threatened gangrene, paralysis, &c. 8. As evacuants, chiefly for the purpose of local depletion. 9. In retrocedent gout, and in retrocession of exanthematous eruptions. 10. To prepare a surface for the endermic application of medicines.

CANTHARIS—CANTHARIDES.

Cantharis vesicatoria, the Spanish Fly, is an insect from

six to ten lines in length, by two or three in breadth, of a beautiful, shining, golden-green color. It is found most abundantly in Spain, Italy, and the south of France, but occurs in all the temperate parts of Europe, and in Western Asia. The Spanish flies swarm on certain trees and shrubs, and may be detected at a considerable distance by their strong, fetid odor, which resembles that of mice. They make their appearance in May and June, and are collected in these months by persons who beat or shake them from the trees on which they lodge, and receive them, as they fall, upon linen cloths spread underneath. They are plunged into hot vinegar and water, or exposed to the vapor of boiling vinegar, and are afterwards dried in the sun or by drying stoves. When perfectly dry, they are packed in canisters, which are carefully closed so as to exclude atmospheric moisture. They are usually imported into this country from some Mediterranean port. A highly esteemed variety comes from South Russia, through St. Petersburg, which is distinguished by the larger size and copper color of the flies.

In the *dried* state, Spanish flies retain their form, color, odor, &c.; their taste is acrid, burning, and urinous; their powder is of a grayish-brown color, interspersed with shining green particles. If exposed to moisture, they are soon decomposed, most speedily when powdered. As, moreover, the powder is liable to adulterations, they should always be purchased whole, and should be powdered as they are wanted for use. They are liable to be attacked by mites, which destroy the interior soft parts: the best mode of preserving them is to expose them, in bottles, to the heat of boiling water, which destroys the eggs of the insect. A little camphor or carbonate of ammonia, or a few drops of strong acetic acid or chloroform, added to the flies, are also recommended as preservatives.

The most important *constituents* of cantharides are a volatile oil, upon which the odor depends, and a white, crystalline substance, termed *cantharidin*, which is the vesicating principle. Cantharidin is soluble in ether, chloroform, the oils, acetic acid, and boiling alcohol, and insoluble in water and cold alcohol;

but, notwithstanding this *insolubility* of cantharidin, watery and alcoholic solutions of cantharides possess the medicinal properties of the insect,—the cantharidin being rendered soluble by the combination in which it exists. *Cantharidin* ($C_{10}H_6O_4$), by the aid of heat, in the presence of water, may be made to combine with the alkalies, the cantharidin becoming converted into cantharidic acid ($C_{10}H_6O_4,2HO$). The cantharidate of potassa has been employed as a blistering agent.

Physiological Effects.—Cantharides are an acrid stimulant. Taken internally, in small doses, they excite the secretion of the kidneys, and sometimes produce more or less irritation of the genito-urinary passages, evinced by strangury, pain, and occasionally the discharge of bloody urine. In large doses, they produce violent gastro-enteric and genito-urinary inflammation; and, in excessive doses, prove fatal, with convulsions, tetanus, delirium, and other cerebro-spinal symptoms. Twenty-four grains have occasioned death. In cases of poisoning, after the stomach has been emptied, opiates, demulcents, topical depletion, &c., are to be resorted to. *Applied to the skin*, cantharides produce inflammation, which terminates in the free secretion of serum under the cuticle. Even when they are externally applied, their constitutional effects, as strangury, tenesmus, &c., are frequently manifested.

Medicinal Uses.—The indications which cantharides are capable of fulfilling, when administered *internally*, as a diuretic, emmenagogue, &c., have been already noticed (see p. 254). Their chief use is as an *external application*, to produce *blisters;* but they are sometimes also employed externally, as *rubefacients*, for the purpose of local or general stimulation in low forms of disease. Cantharides are preferred to all other substances as *epispastics*, and they are used for all the medicinal purposes, that are within the range of this class of medicines.

The following are the forms under which Spanish flies are used *externally:*

Ceratum Cantharidis (*Cerate of Cantharides*), commonly known as *Blistering Cerate*, is made by mixing powdered cantharides (twelve parts) with melted wax and resin (each seven

parts), and lard (ten parts). This is the preparation usually employed to raise a blister. It can be applied without the aid of heat, and should be spread on soft leather or linen, and covered with gauze or unsized paper, to lessen the liability to strangury. From four to twelve hours is the period for which the cerate should be applied—on the scalp a longer application may be required. For an ordinary impression, and where the cutaneous sensibility is not impaired by disease, it need not be kept on more than four or five hours. In cases of children, less time is required for the application of the cerate, and great caution is necessary in applying it to infants. A poultice of bread and milk or flaxseed meal should be afterwards applied, which usually produces vesication, if the action of the blister has not extended beyond rubefaction. If it be desirable to heal the blistered surface immediately, cotton wadding or simple cerate may be placed over it, after the serum has been allowed to escape. To maintain the discharge, the cuticle should be removed, and basilicon ointment applied; if the surface require further irritation, the ointments of savine, mezereon, or cantharides may be used. The open or perpetual blister is, however, not required, for ordinary antiphlogistic purposes. In case of excessive pain, a poultice of bread-crumb and lead water, with gr. $\frac{1}{4}$ of sulphate of morphia mixed in it, or a starch poultice, or lime liniment is a soothing application. Goulard's cerate is an excellent application to heal obstinate ulcers from blisters. For the relief of *strangury*, diluents and diuretics are proper, as flaxseed tea, with sweet spirit of nitre, decoction of uva ursi, &c. *Ceratum Extracti Cantharidis* (*Cerate of Extract of Cantharides*), differs chiefly from the common cerate in being made with an alcoholic extract of the flies instead of the flies themselves; it is a new preparation, and is said to be more active than the old. To prepare it, 5 troyounces of cantharides are to be percolated to exhaustion with stronger alcohol, evaporated to the consistence of a soft extract, and mixed with 3 troyounces of resin, 6 troyounces of yellow wax, and 7 troyounces of lard (melted together). *Ethereal*, *alcoholic*, *hydro-alcoholic*, and *watery extracts* of Spanish flies

have been suggested as substitutes for the *blistering cerate*, and, mixed with wax and spread on thin cloth or paper, are termed *vesicating taffetas*. *Unguentum Cantharidis* (*Ointment of Cantharides*), made by boiling a troyounce of cantharides (digested in six fluidounces of olive oil) with a troyounce of yellow wax, is employed as a stimulating dressing to blistered surfaces, or to produce vesication on delicate skins; it is no longer officinal, but it is a useful preparation. *Linimentum Cantharidis* (*Liniment of Cantharides*), consists of a troyounce of cantharides dissolved in eight fluidounces of oil of turpentine; it is a prompt stimulating liniment in low fevers, and may be applied to the skin to prepare it for the action of the blistering cerate. *Collodium cum Cantharide* (*Collodion with Cantharides*), is made by dissolving gun-cotton in a mixture of alcohol and ether, which has been used to obtain the active properties of cantharides by percolation; 8 troyounces of cantharides are percolated with stronger ether until 15 fluidounces have passed, the percolation is continued until half a pint more of liquid is obtained, which is reduced to a fluidounce and mixed with the reserved liquid, in which 8 troyounces of cotton (prepared by the process for collodion) are dissolved with agitation. It is a colorless, transparent liquid, which, to prevent its evaporation, should be kept in well-stoppered bottles. It furnishes a very convenient mode of blistering a small or irregular surface, and is applied by means of a camel's-hair brush, in successive layers, which should be covered with a piece of oiled silk.

CANTHARIS VITTATA—POTATO FLIES.

Several species of Cantharis are found in the United States, and are good substitutes for C. vesicatoria. C. vittata, or the Potato Fly, is most used. It resembles the Spanish fly in shape, but is rather smaller, being about six lines in length, and inhabits chiefly the potato plant. It contains *cantharidin*.

AQUA AMMONIÆ—WATER OF AMMONIA.

Water of Ammonia (see p. 168) may be used for the purpose of speedy vesication. The *aqua ammoniæ fortior* (see p. 167), five parts, mixed with spirit of camphor, two parts, and spirit of rosemary, one part, has been used as a prompt vesicant, under the name of *Granville's lotion.* A piece of flannel, saturated with the liniment, is applied to the skin, which it will generally blister in from three to ten minutes.

SUPPURANTS.

OLEUM TIGLII—CROTON OIL.

Croton oil (see p. 236), when rubbed on the skin, produces rubefaction, accompanied by a pustular eruption. It is an excellent application to the throat and chest, in subacute or chronic laryngeal and bronchial affections, and to rheumatic joints. It may be applied undiluted, or mixed with one, two, or three parts of olive oil or oil of turpentine, according to the susceptibility of the skin.

UNGUENTUM ANTIMONII—ANTIMONIAL OINTMENT.

This ointment consists of one part of tartrate of antimony and potassa mixed with four parts of lard. The peculiar eruptive effects of tartar emetic have been already noticed (p. 188). It may be used in the form of ointment or solution, in the same cases as croton oil, but it is a more painful and permanent application.

ESCHAROTICS.

Escharotics (from *εσχαρα*, *an eschar*), called also *cauterants*, are medicines which destroy the structure and vitality of the parts to which they are applied. The *eschar*, which their ap-

plication produces, is followed by inflammation and suppuration in the surrounding tissues, by which the slough is separated from the living parts.

They are employed: 1. To effect the destruction of morbid growths, warts, condylomata, polypi, fungous granulations, &c. 2. To decompose the virus of rabid and venomous animals, and of chancres. 3. For the cure of violent inflammation, by their *substitutive* action, as when they are applied to the mucous or cutaneous surfaces, in gonorrhœal ophthalmia, erysipelas, poisoned parts, carbuncle, &c. 4. To stimulate indolent sinuses, ulcers, &c., where their influence is also of a *substitutive* character. 5. To open abscesses. 6. To form issues. 7. To remove morbid heterologous growths, as lupus, cancer, &c.

ARGENTI NITRAS FUSA—FUSED NITRATE OF SILVER.

Lunar Caustic (described at length, p. 135), is the most commonly employed of the caustics. It has the advantage of not liquefying when applied, and its action is therefore confined to the parts with which it is brought in contact. It is used to remove fungous granulations in wounds and ulcers, to destroy warts, to decompose and prevent the absorption of the syphilitic virus in chancres, to alter the action of indolent ulcers, sinuses, and fistulæ, to subdue the inflammatory action of paronychia, erythema, &c., to arrest the progress of erysipelas and cancrum oris, to cut short variolous pustules, to cure skin diseases by a substitutive action, and in inflammations of mucous membranes. In dilutions of various strengths, it is resorted to in every variety of inflammation of the mucous membranes; when a full impression is desired, a solution of gr. xx–xxx in distilled water f℥j, may be employed; for ordinary purposes, gr. ij to water f℥j.

POTASSA.

Caustic Potassa is prepared by the rapid evaporation of *Solu-*

tion of Potassa (see p. 310) with heat. While in the state of fusion, it is received into cylindrical iron moulds, and it occurs in the form of sticks, of a brownish, grayish, or bluish color, a fibrous fracture, the odor of slaking lime, and a caustic, urinous taste. It dissolves in alcohol, and in less than its weight of water, and attracts both moisture and carbonic acid rapidly from the air. It is more or less impure as found in the shops. By digestion in alcohol, it is freed from impurities insoluble in this menstruum (as the carbonates of potassa), and it may be afterwards obtained quite white and pure by evaporation; it is then termed *alcoholic potassa*. The potassa of the shops is a *hydrate*, consisting of one eq. of water and one of potassa.

Effects and Uses.—It is the most powerful known escharotic, and differs from lunar caustic, in extending its action to a considerable depth beneath the surface to which it is applied. It is used chiefly to open abscesses and form issues, and sometimes also to arrest the sloughing of carbuncles. When it is applied to the skin, this should be covered with linen spread with adhesive plaster, having a hole the size of the spot to be cauterized. A solution (ʒjss to fʒij of water), is used as a *rubefacient*.

Potassa cum Calce (*Potassa with Lime*), is prepared by rubbing up equal parts of potassa and lime. It is made into a paste with a little alcohol, and is sometimes termed *Vienna paste;* it has also been formed into sticks. The presence of lime renders this a milder, less deliquescent, and more manageable caustic than potassa.

ACIDUM CHROMICUM—CHROMIC ACID.

Chromic Acid (CrO_3) is obtained by the reaction of sulphuric acid upon a solution of bichromate of potassa. It occurs in the form of anhydrous acicular crystals, of a crimson-red color, and an acid, metallic taste; they are deliquescent, and very soluble in water, with which they form an orange-yellow solution.

Effects and Uses.—This is an *escharotic* of recent introduction into the Materia Medica. It is of unsurpassed power in this particular, decomposing the tissues by its rapid oxidizing

action. Used in the form of paste, or solution more or less diluted, it is a most efficacious application to morbid growths and excrescences, as syphilitic condylomata, &c. It gives less pain than other caustics; but it is to be used with caution, especially to delicate parts like the eye, as its action is deeply penetrating. The solution may be made of the strength of from 100 grains up to a troyounce to a fluidounce of water; and is to be applied by means of a pencil or glass rod.

ACIDUM ARSENIOSUM—ARSENIOUS ACID.

This is a powerful escharotic (see p. 297), and is occasionally applied in lupus, onychia maligna, cancerous ulcers, and to change the action of indolent sinuses; but its use is attended with danger. It may be diluted with one or more parts of sulphur.

ZINCI CHLORIDUM—CHLORIDE OF ZINC.

This is also a powerful escharotic (see p. 134); and, in addition to its corrosive properties, it appears to exercise a greater influence over the vital action of neighboring parts, than some of the other caustics. The separation of its eschar leaves very healthy and vigorous granulations, and it is one of the best applications that can be made to intractable indolent ulcers and sinuses. It will cure lupus.

LIQUOR HYDRARGYRI NITRATIS—SOLUTION OF NITRATE OF MERCURY.

This preparation (see p. 288), termed also the *acid* nitrate of mercury, is a valuable caustic application to malignant ulcers, &c.

HYDRARGYRI CHLORIDUM CORROSIVUM—CORROSIVE CHLORIDE OF MERCURY.

Corrosive Sublimate is more frequently used as a stimulant

wash than as a caustic. For its properties, uses, and modes of application, see p. 284.

POTASSÆ BICHROMAS—BICHROMATE OF POTASSA.

This salt, already noticed under the head of alteratives (see p. 305), is a good caustic application, in saturated solution, or powder, to syphilitic and other vegetations.

ACIDA MINERALIA—MINERAL ACIDS.

The mineral acids (see p. 138), are powerful escharotics, but are inconvenient for many uses, on account of the extension of their action beyond the point of application. On the other hand, they can be made to reach the bottoms of sinuses and fistulæ, which are inaccessible to the solid caustics. Nitric acid, for such purposes, has no equal in the list of escharotics; it is also used to destroy warts. Properly diluted, the mineral acids are employed as injections, gargles, &c.; and in the form of ointment in skin diseases.

Sulphate of Copper (see p. 132), and Alum (see p. 162), are mild escharotics, but are chiefly used to remove fungous granulations in ulcers. The *actual cautery* and *moxa* have been alluded to under the head of Heat (see p. 21).

ORDER II.—DEMULCENTS.

Demulcents, or *Lenitives*, are medicines which *soften* and relax the tissues, and, when applied to irritated or inflamed surfaces, diminish heat, tension, and pain. They consist chiefly of gum, or mucilage, or of a mixture of these with saccharine and farinaceous substances, and form with water viscid solutions. Their constitutional effects are principally nutritive, though perhaps to some extent they relieve irritation in distant organs, by modifying the acridity of the secretions.

Demulcent solutions are administered internally: 1. To sheathe and protect the gastro-enteric surface from the injurious effects of irritating substances—particularly acrid poisons. 2. To relieve irritation and inflammation of the alimentary canal, as in gastritis, enteritis, diarrhœa, and dysentery; and for this purpose they may be administered either by the mouth or rectum. 3. In catarrhal affections, in which they are probably useful, in part by the transmission of their lubricating and soothing effects on the fauces and œsophagus by reflex action to the laryngeal and bronchial membranes, and in part by modifying the acridity of expectorated matters. 4. In affections of the urinary passages, as ardor urinæ, cystitis, &c., and, in these cases, they act chiefly by diminishing the acridity of the secretions. 5. As agreeable drinks, to quench thirst and promote the action of the secreting and exhaling organs, in febrile affections. Their effects, in these cases, are owing partly to the water which they contain, to which they are added merely for the sake of flavor, and partly also to the nutrient which they furnish. When administered with the object of increasing the proportion of the fluid parts of the blood, demulcents are termed *diluents*. 6. As light diet for the sick. 7. For pharmaceutical purposes, to suspend substances insoluble in water, &c.

Externally, mucilaginous solutions are extensively employed, to relieve the heat, swelling, and pain of inflammations, wounds, burns, &c.; to hasten suppuration, where inflammation is too far advanced for resolution; to cleanse foul and scabby ulcers; to promote suppuration from granulating surfaces, &c., &c. Mucilaginous and amylaceous substances are applied to inflamed and ulcerated parts, mixed with water so as to form soft masses, termed *cataplasms* or *poultices*. These are useful vehicles of heat and moisture to the skin, and are used also for the relief of internal inflammations, as when applied to the chest and abdomen in pleurisy, bronchitis, peritonitis, dysentery, &c. Applied externally, this class of medicines is termed *emollients*.

ACACIA—GUM ARABIC.

Gum Arabic is the CONCRETE JUICE of Acacia vera, Acacia Arabica, and other species of Acacia (*Nat. Ord.* Fabaceæ), thorny or prickly trees or shrubs of Africa and Arabia. The gum exudes, either through natural cracks in the bark, or through incisions made to facilitate its exudation, and hardens on exposure. The most abundant yield is in the hot and dry weather, and is obtained from the sickliest trees. Several commercial varieties are known, as Turkey, Barbary, Senegal, India, &c., of which the two most important are Turkey gum, and Senegal gum. 1. *Turkey gum* comes from the Levant or other parts of the Mediterranean, and is the kind usually found in the shops. It consists chiefly of small, irregular fragments, interspersed with larger pieces, of a whitish color, which is sometimes slightly tinged with yellow or reddish-yellow. It is lighter-colored, more brittle, more readily soluble, and purer than other varieties, and is generally characterized by innumerable minute fissures pervading its substance. 2. *Senegal gum* comes from the western coast of Africa. It occurs in roundish or oval unbroken pieces, larger, less brittle, and breaking with a more conchoidal fracture than those of Turkey gum, sometimes whitish, but generally yellowish, reddish, or brownish-red. 3. *Barbary gum* comes from Morocco; it is derived, in part at least, from A. gummifera, and consists of two kinds, one resembling the Turkey, the other the Senegal gum. 4. *India gum*, though brought from India, is collected on the northeastern coast of Africa, and in the ports of the Red Sea. It is in pieces of varying size, color, and quality, and is often contaminated with Bassora gum, which is insoluble in water. Gum is also imported into England from the Cape of Good Hope, and from Australia. All the varieties are more or less transparent, hard, brittle, and pulverizable, and form a white powder. They are inodorous, with a feeble, slightly sweetish taste, and, when pure, dissolve wholly in the mouth. When kept in a dry place, they undergo no change by time.

Chemical Constituents.—Gum Arabic consists almost wholly of a peculiar proximate principle, usually termed *gum*, but latterly designated by chemists as *arabin*. It is soluble in hot or cold water, forming a viscid solution, called *mucilage*, and is insoluble in alcohol, ether, and the oils. Alcohol precipitates gum from its aqueous solution; subacetate of lead (which is a delicate test), nitrate of lead, and solution of sesquichloride of iron also precipitate it from solution. Gums of inferior transparency and solubility contain *bassorin*, an inert principle, insoluble in water and alcohol.

Effects and Uses.—Gum Arabic is extensively employed, internally, as a demulcent in gastro-enteric inflammation, diarrhœa, dysentery, cases of acrid poisoning, &c.; as a lubricant to the fauces in catarrhal affections, and also as a vehicle for anodynes and expectorants in cough mixtures; and as a diluent in fevers and inflammatory cases. It is not now considered to be digestible and can scarcely rank (as formerly supposed) with nutrients. It is usually administered in solution (a troyounce to boiling water Oj, to be given when cool); in cases of irritation of the fauces, it may be taken in the mouth, and allowed slowly to dissolve. For pharmaceutical purposes, gum arabic is much used to suspend insoluble substances in water, and in making pills and lozenges. *Mucilago Acaciæ* (*Mucilage of Gum Arabic*)—four troyounces to boiling water Oss),—is used in making pills, emulsions, &c.; it becomes sour by keeping. *Syrupus Acaciæ* (*Syrup of Gum Arabic*),—(two troyounces to water f℥viij, with sugar fourteen troyounces),—is used for the same purposes. *Mistura Amygdalæ* (*Mixture of Almond*, or *Almond Emulsion*),—is made by dissolving a mixture of half a troyounce of *blanched* sweet almonds, 30 grains of gum arabic, 120 grains of sugar, in half a pint of water; it is a pleasant demulcent and vehicle for other medicines. By dissolving equal parts of sugar and gum arabic in water and evaporating, an agreeable demulcent is obtained, known as *gum pectoral*, which is sold as an imitation of *jujube paste*.

TRAGACANTHA—TRAGACANTH.

This is a CONCRETE JUICE obtained from Astragalus verus and other species of Astragalus (*Nat. Ord.* Fabaceæ). They are small shrubs found in Persia, Asia Minor, and countries bordering on the Levant—with numerous branches, covered with imbricated scales and beset with spines. Tragacanth exudes spontaneously in the hot weather, and hardens as it exudes, in forms of various shapes. It occurs in irregular, tortuous pieces, of a whitish or yellowish-white or occasionally a slightly reddish color, somewhat translucent, resembling horn in appearance. It is hard and fragile, but very difficult of pulverization, has no smell and very little taste. When heated with water, it swells and forms a paste, and, if agitated with an additional quantity, it forms a uniform mixture, from which it is, however, almost entirely deposited, upon standing a day or two. It contains two constituents, one soluble in water, resembling *arabin*, the other termed *tragacanthin*, which is probably identical with *bassorin*.

Effects and Uses.—Tragacanth is seldom given internally, on account of its difficult solubility. It is useful in suspending heavy insoluble powders, and answers better than gum arabic to impart consistence to lozenges. *Mucilago Tragacanthæ* (*Mucilage of Tragacanth*),—(a troyounce to boiling water Oj), —is used in making pills and troches, and for the suspension of heavy insoluble metallic substances.

LINUM—FLAXSEED.

This is the SEED of Linum usitatissimum, or Common Flax (*Nat. Ord.* Linaceæ), an annual plant, of the height of two feet, originally a native of Eastern countries, but naturalized in Europe, and cultivated in all parts of the world. The SEED and OIL are both officinal. The seeds are about a line in length, oval, smooth, and glossy, of a brown color externally, and yellowish-white within; a variety of flax is cultivated in Ohio,

the seeds of which are greenish-yellow. Flaxseeds are inodorous, and have an oily, mucilaginous taste. They contain a *fixed oil*, a large proportion of *mucilaginous matter*, vegetable albumen, and various other ingredients; the mucilaginous matter, which is found chiefly in the husks of the seeds, consists, about one-half, of a principle soluble in cold water, resembling *arabin*, and, about one-third, of a principle insoluble in water. The *oil* (*oleum lini* or *linseed oil*), is obtained by expression from the interior part of the seeds; it is laxative in the dose of f℥i–ij, but it is chiefly used, externally, as an ingredient of *linimentum calcis* (see p. 314).

Effects and Uses.—The *compound infusion* of flaxseed (half a troyounce to boiling water Oj, with liquorice root ℥ij), is an admirable demulcent, extensively employed *internally*, in catarrh, bowel-complaints, nephritic and calculous complaints, strangury, &c.; and also (without the liquorice root), as an *external* antiphlogistic application. Decoction is an improper mode of preparing a demulcent solution of flaxseed, as boiling extracts part of the oil; but it answers very well when it is used as a laxative enema. *Flaxseed meal* (*lini farina*), mixed with hot water, forms a much-used emollient *poultice*. The cake, remaining after the expression of the oil, retains the mucilaginous and albuminous constituents of the seeds, and forms a food for cattle, under the name of *oil-cake*. This is used for making poultices, but it is inferior to the meal made from the seeds which have not been deprived of their oil.

ULMUS FULVA—SLIPPERY-ELM BARK.

This is the INNER BARK of Ulmus fulva, or Slippery Elm (*Nat. Ord.* Ulmaceæ), a lofty indigenous tree, which is found throughout the United States, north of Carolina, and grows most abundantly west of the Allegheny Mountains. The inner bark is prepared for use by the removal of the epidermis; it is found in the shops in long flat pieces, of a fibrous texture, tawny on the outer surface and reddish on the inner, of a peculiar but not unpleasant smell, and a very mucilaginous taste.

It affords a light, grayish, fawn-colored powder. A large quantity of mucilaginous matter is contained in it, which is readily yielded to water. Much of the bark lately brought into the market is inferior, containing but little mucilage; it is less fibrous and more brittle than the genuine bark.

Effects and Uses.—Slippery-elm bark is a valuable demulcent, extensively and advantageously employed in dysentery, diarrhœa, genito-urinary diseases, catarrhs, &c. It is also highly nutritious. Externally, it is an excellent emollient application, in the form either of infusion, or of poultice made with the powder. It has been also recommended for the dilatation of strictures and fistulæ. The infusion—*mucilago ulmi* (*mucilage of slippery-elm bark*),—(a troyounce to boiling water Oj),—may be used *ad libitum.*

SASSAFRAS MEDULLA—SASSAFRAS PITH.

Sassafras pith is the PITH of the stems of Sassafras officinale (see p. 244). It occurs in light, spongy, whitish, slender, cylindrical pieces, of a mucilaginous taste. It abounds in a gummy matter, which it yields readily to water, forming a limpid, viscid mucilage. This *mucilage* (℥j to cold water Oj), is a pleasant demulcent drink in dyspeptic, nephritic, and catarrhal affections, and is much used as a soothing application in ophthalmia.

ALTHÆA—MARSHMALLOW.

The ROOTS of Althæa officinalis (*Nat. Ord.* Malvaceæ), and other Malvaceæ, herbaceous European plants, occasionally found too on the borders of salt marshes in our own country, are much used in Europe as demulcents. They are imported in pieces three or four inches in length, of nearly the thickness of the finger, light, easily broken, white externally, of a peculiar faint smell, and a mild, mucilaginous, sweetish taste. The chief constituents of marshmallow are mucilage and starch, the former soluble in cold water, the latter requiring hot water. It con-

tains also *asparagin* or *malamide*, a principle found in asparagus roots and other plants.

Uses.—Marshmallow decoction is employed as a demulcent in inflammatory and irritated conditions of the mucous membranes of the respiratory, digestive, and urinary organs, and poultices made of the bruised or powdered root are used externally.

SESAMI FOLIUM—BENNE LEAF.

This leaf is the product of Sesamum Indicum and Sesamum Orientale (*Nat. Ord.* Bignoniæ), annual plants, growing to the height of four or five feet, with ovate-lanceolate, lobed leaves, reddish-white axillary flowers, and an oblong capsule containing small, oval, yellowish seeds. They are natives of India, but are now raised in Asia, Egypt, Italy, and also in South Carolina, and in the neighborhood of Philadelphia. The seeds contain a FIXED OIL, and the LEAVES yield to cold water a large quantity of mucilage, resembling that of sassafras pith. This is a highly esteemed demulcent drink, used in cholera infantum and infantile bowel-complaints. The seeds are eaten as food by the negroes in Carolina, in broths, puddings, &c. The *oil* (*oleum sesami*), which is inodorous, of a bland, sweetish taste, and keeps well, may be used internally or externally as a substitute for olive oil.

GLYCYRRHIZA—LIQUORICE ROOT.

This is the ROOT of Glycyrrhiza glabra (*Nat. Ord.* Fabaceæ), a small herbaceous, perennial plant, of the countries around the Mediterranean. It is imported from Sicily and Spain; and a portion of the Sicilian root is said to be the product of G. echinata. As found in the shops, liquorice root is in long, wrinkled pieces, often worm-eaten, varying from a few lines to more than an inch in thickness, externally grayish-brown, internally yellowish, without smell, and of a sweet, mucilaginous, sometimes slightly acrid taste. The best pieces are of the

brightest yellow internally. The powder is grayish-yellow, or, if it is powdered with the epidermis removed, pale sulphur-yellow. The constituents of liquorice root are, a peculiar, transparent yellow, sweetish substance, termed *glycyrrhizin* (which is scarcely soluble in cold water, but soluble in boiling water and alcohol, and is insusceptible of the vinous fermentation), starch, albumen, an acrid resin, &c.

Effects and Uses.—A decoction of liquorice root (a troy-ounce boiled for a few minutes in water Oj), is a useful demulcent in dysenteric, catarrhal, and nephritic affections; it is also added to decoctions of acrid substances, to cover their taste and acridity. It should be made of the root, *deprived of its cortical part*, which is acrid and without demulcent virtues; by long boiling, the acrid resin is extracted. The powder is used in making pills (see p. 28).

Extractum Glycyrrhizæ (*Liquorice*), is made by the evaporation of a decoction of the half-dried root. It comes to this country chiefly from Leghorn and Messina, and in part, also, from Spain; good liquorice is prepared, too, in New York and in England. *Crude liquorice*, when good, occurs in black, flattened, cylindrical rolls, about an inch in diameter, which are dry, brittle, with a shining fracture, of a very sweet, peculiar, slightly acrid taste, and are quite soluble in water. It is, however, much sophisticated, and for internal use is, generally, *refined*, by dissolving the impure extract in water, without ebullition, straining the solution, and evaporating; sugar is often mixed with it, and sometimes mucilage or glue. *Refined liquorice* is in small cylindrical pieces, not thicker than a pipe-stem. Liquorice is a pleasant demulcent, much used as an addition to cough mixtures and lozenges, and to acrid infusions and decoctions. *Mistura Glycyrrhizæ Composita*, commonly called *Brown Mixture*, consists of liquorice, gum arabic, sugar, each half a troyounce; paregoric, f℥ij; antimonial wine, f℥j; sweet spirit of nitre, f℥ss; water, f℥xij; dose, f℥ss. Liquorice enters into the composition of several *troches* already noticed.

CETRARIA—ICELAND MOSS.

Cetraria Islandica, or Iceland Moss (*Nat. Ord.* Lichenaceæ), is a foliaceous, erect lichen, from two to four inches high, found in the northern latitudes and mountainous districts of the new and old continents. It is principally obtained from Norway and Iceland; and, as found in the shops, consists of irregularly lobed and channeled coriaceous leaves, fringed at their edges with rigid hairs, of a brownish or grayish-white color, darker on the upper surface, and sometimes marked with blood-red spots. It is almost odorless, and has a bitter, mucilaginous taste; its powder is whitish-gray. It gives up its virtues to boiling water, and consists chiefly of a kind of amylaceous matter (which is colored blue by iodine, and is termed *lichenin*), and a bitter principle, termed *cetrarin*, which yields *cetraric acid;* it contains, besides, other principles.

Effects and Uses.—Iceland moss is a demulcent tonic, and is also highly nutritious. It is adapted to cases requiring a light aliment combined with a mild and acceptable tonic; and, from its demulcent properties, has a soothing influence in inflammations of the various mucous membranes. It is chiefly used in chronic affections of the pulmonary and digestive organs, in the form of decoction (half a troyounce boiled in water enough to make a pint), which may be taken *ad libitum.* By maceration in water or a weak alkaline solution, Iceland moss may be deprived of its bitter principle; and it is then used as a mild nutritive demulcent.

CHONDRUS—IRISH MOSS.

Chondrus crispus, Carrageen or Irish Moss (*Nat. Ord.* Algaceæ), is a marine alga, found chiefly on the west coast of Ireland, where it is prepared for use by washing, bleaching, and drying. As found in the shops, it consists of fronds, from two to three or four inches long, mostly yellowish or dirty-white, but intermixed with purplish-red portions, nearly inodor-

ous, and of a mucilaginous taste. It swells up in warm water, and is almost entirely dissolved when boiled. Its chief constituent is a peculiar mucilaginous principle, for which the term *carrageenin* has been proposed; and it contains also some mucus, resins, &c.

Effects and Uses.—It is a very agreeable nutritive demulcent, useful in bowel-complaints and pectoral affections. It may be given in the form of *decoction* (half a troyounce to water, Ojss, boiled to Oj), flavored with lemon-juice and sugar; or it may be made with milk or cream into *blanc-mange*, which forms an excellent light diet for the sick.

MARANTA—ARROW-ROOT.

Arrow-root is a FECULA, obtained from the ROOT of Maranta arundinacea (*Nat. Ord.* Marantaceæ), a perennial herbaceous plant, of the height of two or three feet, originally found in the West Indies, and now cultivated in both the West and East Indies, Florida, Ceylon, and Sierra Leone. Other plants also furnish some of the arrow-root of commerce. The ROOT of M. arundinacea is a white, fleshy, scaly, articulated, cylindrical tuber, from six inches to a foot or more in length, furnished with long fibres, and giving origin to several tuberous stoles, similar to itself. It consists principally of fecula or starch, which is extracted from the roots, when they are about a year old: they are washed and beaten into a pulp, which is stirred in water, and the fibrous part wrung out by the hands; the milky liquor is strained and suffered to settle, and the subsiding mass is dried in the sun. It occurs in the form of a light, opaque, white powder, or small pulverulent masses, without odor or taste; and is brought to our market chiefly from the West Indies, and to some amount, also, from Georgia and Florida. The preferred kind is that which comes from Bermuda.

Arrow-root is a pure starch, insoluble in cold water. Its peculiar characteristic is the structure and appearance of its

granules, *when viewed under a microscope;* and this affords the best means of distinguishing it from other feculæ, which are mixed with or sold for it. The granules of the genuine arrow-root are ovate-oblong, irregularly convex, with fine rings, a hilum or central cavity, and often short processess or spines.

Effects and Uses.—Arrow-root is a valuable nutritive demulcent, forming a very pleasant light diet in bowel-complaints and pulmonary and urinary affections. It is also much used as an article of food for infants. It is prepared by mixing a tablespoonful with a little cold water until it is reduced to a paste, and then gradually adding a pint of boiling water or milk, or due proportions of each, stirring the mixture at the same time. Lemon-juice and sugar, or wine and spices, may be added, according to the indication. It is generally made with milk, when used as a diet for infants.

CANNA.

Canna starch (known also by the French name of *tous les mois*), is a fecula prepared from the RHIZOMA of an undetermined species of canna, generally believed, however, to be C. edulis. It comes from the West Indies and Central America, and occurs in the form of a light, very white powder, of a shining appearance. Its granules are longer than those of any other variety of starch, and are ovate or oblong, with numerous regular, unequally distant rings. It is used and prepared like arrow-root.

TAPIOCA.

This is the FECULA of the ROOT of Janipha Manihot (*Nat. Ord.* Euphorbiaceæ), a South American shrub, some six or eight feet in height, cultivated also in the West Indies, where it is termed the *cassava* plant. The ROOT is a very large, white, fleshy tuber, and is found under two varieties, the *sweet*

and *bitter;* the latter contains an acrid, poisonous juice, which is, however, volatile, and dissipated by heat. Tapioca is obtained from the expressed juice of both varieties, from which it is deposited as a *starchy powder;* it is afterwards dried by heat, which causes the starch-grains to swell and agglomerate into small masses or lumps. It occurs in the form of irregular, hard, white, rough grains, of little taste, and partially soluble in cold water. In boiling water it swells up, and forms a transparent jelly-like mass, which constitutes an admirable *demulcent article of diet*, applicable to the same cases as arrow-root.

SAGO.

Sago is the prepared FECULA of the PITH of Sagus Rumphii, or the Sago Palm, and of other species of Sagus (*Nat. Ord.* Palmaceæ), small trees of the Moluccas and other East India Islands. The immature stems contain a great mass of spongy medullary matter, which is extracted in the state of a coarse powder; this is mingled with water, and the mixture, upon standing, deposits the insoluble farina, which, when dried, constitutes sago. The sago of commerce is prepared by forming the meal into a paste with water, and rubbing it into grains. It is *refined* at Malacca and Singapore, so as to give the grains a fine pearly lustre, and in this state is called *pearl sago*. *Pearl Sago* is the preferred variety, and is that which is now in general use. It is in small grains, about the size of a pin's head, hard, whitish, of a light-brown color, inodorous, and nearly tasteless. *Common Sago* is in larger, duller, browner grains, often mixed with a dirty-looking powder.

Sago is, chemically, a starch. Common Sago is insoluble in cold water; but pearl sago is partially dissolved by it, owing to the heat which it has undergone. The only use of sago is as a bland, unirritating article of diet. It should be boiled some time in water (or milk, if preferred), and carefully stirred, to insure the thorough solution of the grains; the solution, after

being strained, may be flavored with sugar, lemon-juice, wine, or spices, according to the requirements of the case.

HORDEUM—BARLEY.

Barley, as prepared for medicinal use, consists of the decorticated SEED of Hordeum distichon, and other species of Hordeum (*Nat. Ord.* Graminaceæ); well-known grains, supposed to be derived from Tartary, and now in cultivation in most parts of the world. The SEEDS are oval, oblong, marked with a longitudinal furrow, of a yellowish color externally, white within, a faint odor, and a mild, sweetish taste. They contain starch, gluten, gum, sugar, and a peculiar principle termed *hordein*, analogous to lignin.

When made to germinate by warmth and moisture, and afterwards baked to deprive them of vitality, barley-seeds are termed *malt;* this process increases the nutritious properties of the grain, by increasing the proportions of sugar, starch, and gum, at the expense of the hordein. Deprived of its husk, the grain is termed *hulled barley*, and hulled barley, when ground, is *barley meal.* PEARL BARLEY is the grain with all the investments removed, and afterwards rounded and polished in a mill; it is thus freed from its fibrous matter, and is the only fit form for medicinal use. It consists of small, white, oval grains, with a dark longitudinal furrow on one side, and yields its virtues to boiling water. In the form of *decoction*, and suitably flavored, it makes an exceedingly bland, demulcent, nutritive drink, in fevers and inflammatory cases; (two troyounces, previously washed with cold water, are mixed with water Oss, and boiled for a short time; this water should be thrown away, and Oiv boiling hot are poured upon the barley, and boiled to Oij). A decoction of *malt* is more nutritious; mixed with hops, it is termed *wort.*

AVENÆ FARINA (*Oatmeal*),—the meal, prepared from the seeds of Avena Sativa (*Nat. Ord.* Graminaceæ),—furnishes a pleasant diet for the sick, more nutritious than the pure

starches, as it contains 3 per cent. of albumen with 72.8 per cent. of starch. It has a slight laxative influence on the bowels, and is often administered to assist the action of cathartics. *Oatmeal gruel* is prepared by boiling from one to two troy-ounces of the meal in three pints of water to a quart, straining the decoction, allowing it to stand till it cools, and then pouring off the clear liquor from the sediment. It may be flavored with sugar, and lemon-juice or raisins.

Oryza (*Rice*),—the fruit of Oryza Sativa (*Nat. Ord.* Graminaceæ), containing about 85 per cent. of starch, and nearly 4 per cent. of gluten, is an excellent demulcent diet for the sick, in affections of the bowels. *Rice-water*, made by boiling a troyounce in a pint of water for an hour, may be used as a drink.

Salep—the prepared bulbs of Orchis mascula (*Nat. Ord.* Orchidaceæ), consists of small, oval, hard, heavy, semi-transparent masses, of a yellowish color, a feeble odor, and a mild mucilaginous taste. It contains, like tragacanth, two gums (one insoluble, the other soluble), and also starch. It is demulcent and highly nutritive, and is used in the same way as tapioca, sago, &c. The *Castillon powders*, consisting of salep, sago, and tragacanth (in powder), each a drachm, prepared oyster-shell a scruple, and cochineal enough to give color to the mixture, constitute an excellent article of diet in bowel complaints. A drachm may be taken boiled in a pint of milk.

Amylum (*Starch*), a proximate principle, pervading the vegetable kingdom, is used in solution as a demulcent to irritated surfaces, as a vehicle for anodyne enemata, as an antidote for iodine, and, in powder, as a desiccant.

Gelatina (*Gelatin*), a solid, transparent, corneous substance, obtained from the bones and other tissues of animals, (soluble in boiling water, and forming, on cooling, a transparent jelly), may be noticed with demulcents. When dried, it is found in

the form of whitish, or yellowish, semi-transparent, hard and tough, tasteless, inodorous strips. It is used to make soups and jellies for the sick, but it is not of easy digestion, and it does not nourish the nitrogenous tissues. In solution, it has been used as an enema in dysentery and hemorrhoids. And in pharmacy, it is employed to make capsules for the administration of disagreeable liquid medicines, and as a coating for pills.

Ichthyocolla (*Isinglass*), prepared from the swimming bladder of Acipenser huso (the sturgeon), and of other species of fish, is the purest form of gelatin. *Court-plaster* is made by coating oiled silk with a solution of isinglass.

For *external use*, the ANIMAL FATS are employed as *emollients*.

Adeps (*Lard*), is the PREPARED FAT of sus scrofa (the hog). It is used in pharmacy as an addition to poultices, and as an inunction in the exanthemata, particularly scarlatina. *Cerate of lard*, *ceratum adipis* (formerly termed *simple cerate*), is made by melting together two parts of lard and one part of white wax. *Unguentum adipis* (*ointment of lard*), is made by melting together four parts of lard and one part of white wax. *Lard oil* (the olein of lard), is a good vehicle for anodyne enemata.

Sevum (*Suet*), is the PREPARED FAT of ovis aries (the sheep).

Cetaceum (*Spermaceti*), is a peculiar CONCRETE SUBSTANCE, obtained from Physeter macrocephalus (the spermaceti whale). *Spermaceti cerate* (*ceratum cetacei*), is made by melting together one part of spermaceti and three parts of white wax, and then adding five parts of olive oil.

Cera Flava (*Yellow Wax*), is a peculiar CONCRETE SUBSTANCE, prepared by Apis mellifica (the honey bee).

Cera Alba (*White Wax*), is yellow wax bleached. It is chiefly used in making cerates, ointments, and plasters.

OLEUM THEOBROMÆ—OIL OF THEOBROMA.

This oil, commonly known as *butter of cacao*, is the concrete oil of the fruit of Theobroma Cacao (*Nat. Ord.* Sterculiaceæ), a handsome tree, from twelve to twenty feet in height, growing in Mexico, the West Indies, Central America, and South America. The fruit is an ovate-oblong capsule or berry, half a foot in length, with a thick, coriaceous, ligneous rind, inclosing a whitish pulp, in which numerous ovate seeds are imbedded, about the size of an almond. Separated from the matter in which they are enveloped, these constitute the *chocolate-nuts* of commerce (see p. 93). They contain FIXED OIL (*cacao butter*), *theobromia*, and other matters. *Theobromia* is a nitrogenous alkaloid, analogous to caffeina. *Cacao butter* is obtained by expression, decoction, or the action of a solvent. It occurs in whitish or yellowish oblong cakes, of the consistence of tallow, and of an agreeable odor and taste. It contains a large proportion of stearin, also palmitin and olein. It is used in pharmacy for coating pills, and also largely in preparing suppositories, for which it is well adapted from its consistence and blandness.

GLYCERINA—GLYCERIN.

This is a substance which exists in oils in combination with the fatty acids (stearic, margaric, oleic, &c.), and is liberated from them, when they unite with bases in the process of saponification. It is usually obtained in the process for making lead plaster, by mixing litharge (oxide of lead) with olive oil and boiling water, by which the fatty acid unites with the lead, and is precipitated, and the glycerin remains in solution. It is freed from any lead it may contain by means of a stream of sulphuretted hydrogen gas, and is afterwards filtered through animal charcoal; or it may be made more directly by blowing steam through fat, which causes a separation of the glycerin and fatty acids. It is a thick, syrupy liquid, colorless or straw-

colored, unctous to the touch, inodorous, and of a sharp, sweet taste. When pure, its sp. gr. is 1.26, when it contains 98 per cent. of anhydrous glycerin. It is soluble in oils, alcohol, and water, but is insoluble in ether and chloroform. It is a very general solvent, and does not evaporate when exposed to the air, but absorbs one half its weight of water.

Effects and Uses.—Glycerin is a bland and unirritating substance. It has the capacity of diffusing itself freely over and through organic matter, incorporating itself between organic molecules, by which it is absorbed and appropriated. It may be used *internally* as a nutrient and demulcent, and is particularly efficacious in cachectic, strumous, and asthenic conditions in *children;* but it is as a *topical* application that it is chiefly employed. As an enema in dysentery, to soften hardened mucus in the air-passages, in various cutaneous affections, in diphtheria, in deafness attended with dryness of the meatus, and as a vehicle or solvent for active medicines, glycerin is a valuable article. The name *plasma* is applied to a compound of glycerin (f℥i) and starch (grs. 70), mixed at 240° F,; this is used as a substitute for ointments, and is a good excipient for pills.

COLLODIUM—COLLODION.

This is a solution of gun-cotton in ether and alcohol. Gun-cotton is prepared by adding half a troyounce of pure cotton to a mixture of 10 troyounces of nitrate of potassa in 15½ troyounces of sulphuric acid; the cotton is to be afterwards washed first with cold and then with boiling water, and this is to be displaced with stronger alcohol; 56 grains of gun-cotton, dried at 212° F., may be dissolved in a mixture of 3½ fluidounces of stronger ether and a fluidounce of stronger alcohol. Collodion is a colorless, transparent, syrupy liquid, with a strong ethereal smell. By exposure to the air, the solvent evaporates, with a deposit of crystals of gun-cotton, the collodion thus solidifying, and, in so doing, contracting and becom-

ing strongly adhesive. In this way it proves antiphlogistic, by driving the blood away from a part, limiting effusion, and promoting absorption, and, at the same time, acts as an admirable emollient by protecting an inflamed surface from the action of the air. It is a useful application to ulcers, fissures, and skin diseases, and erysipelatous parts. It is used also in surgery as a substitute for adhesive plaster, and in pharmacy as a vehicle for other medicines. *Iodized collodion* (a very good solution of iodine for external application), contains from ten to twenty grains of iodine in a fluidounce of collodion. Collodion containing tannic acid (gr. xx–f℥i), is a good styptic application.

LIQUOR GUTTÆ PERCHÆ—SOLUTION OF GUTTA PERCHA.

This is a solution of a troyounce and a half of gutta percha in 17 troyounces of purified chloroform. In preparing it, carbonate of lead is employed to free it from coloring matter. It is a clear, colorless, or nearly colorless solution, and should be kept in well-stoppered glass vials. By the evaporation of the chloroform, this proves an admirable application to inflamed or abraded parts in skin affections, chaps, &c.; also an excellent protective coating to parts threatened with bed-sores or liable to excoriation.

FERMENTUM—YEAST.

This well-known product of fermentation is a flocculent, frothy, somewhat viscid substance, of a dirty-yellowish color, a sour, vinous odor, and a bitter taste. It is insoluble in alcohol or water. Its most important characteristic is its power of exciting the vinous fermentation in saccharine and starchy liquids. It is occasionally used in low fevers, attended with irritability of the stomach, in the dose of f℥ss–ij, every two or

three hours, which sometimes proves laxative. *Externally*, it is added to farinaceous poultices, applied to sloughing ulcers.

MEL—HONEY.

This liquid, the familiar product of the bee, best used in the form of *Mel Despumatum* (*Clarified Honey*), is a slightly laxative article of food, and is used in pharmacy, and as an agreeable demulcent ingredient in gargles.

Saccharum (*Sugar*), and Syrupus Fuscus (*Molasses*), are pleasant demulcents, useful in slight catarrhal affections, and entering in endless variety of combination into most domestic and medicinal remedies for this class of affections. Their pharmaceutical uses are manifold; the preservative action of sugar is of inestimable advantage in this branch of the Materia Medica.

Saccharum Lactis (*Sugar of Milk*), the saccharine principle of milk, is used as a bland non-nitrogenous article of diet. By fermentation, sugar of milk gives rise to *lactic acid* (*acidum lacticum*), a limpid, syrupy liquid, which has been used in certain forms of dyspepsia, and for the removal of phosphatic deposits in the urine, in the dose of ʒi–iij during the day.

ORDER III.—COLORING AGENTS.

These are employed exclusively for pharmaceutical purposes. The following articles enter into officinal preparations, to which they are intended to communicate their peculiar color.

CROCUS—SAFFRON.

This is the stigmas of Crocus Sativus (*Nat. Ord.* Iridaceæ), a small perennial plant, the native country of which is Greece

and Asia Minor, but now cultivated all over Europe and in our own country. In Lancaster county, Pennsylvania, it has been raised to considerable extent. The stigmas are an inch or more in length, of a rich deep-orange color, a peculiar aromatic odor, and a warm, pungent, bitter taste.

Saffron is now admitted to possess little if any medicinal activity, and is used only to impart color and flavor to officinal preparations.

SANTALUM—RED SAUNDERS.

This is the WOOD of Pterocarpus Santalinus, a large tree of India and Ceylon (*Nat. Ord.* Fabaceæ). It comes in roundish or angular billets, internally of a blood-red color, externally brown, of little smell or taste; in the shops, it is found in the form of chips, raspings, or coarse powder. It is employed solely to give color to spirits and tinctures.

COCCUS—COCHINEAL.

This is an insect, termed Coccus Cacti, of Mexico and Central America, naturalized in Teneriffe and other places. The *female* insect, *dried*, constitutes the article of the shops. It occurs in the form of roundish or somewhat angular grains, about an eighth of an inch in diameter, convex on one side, concave or flat on the other, and wrinkled. Two varieties are distinguished, one reddish-gray, the other nearly black, known as *silver* grains and *black* grains. It has a faint heavy odor, and a bitter, slightly acidulous taste.

Cochineal has had antispasmodic virtues attributed to it, and has been used in whooping-cough, especially in combination with carbonate of potassa—dose, to infants, a third of a grain three times a day. It is chiefly employed, however, to color tinctures and ointments.

ORDER IV.—ANTHELMINTICS.

Anthelmintics are medicines which promote the expulsion of worms from the alimentary canal. They act in different ways: some weaken or destroy the worms by a direct poisonous influence, others by mechanical means; the drastic cathartics have an anthelmintic effect, from the increased secretion and exhalation which they induce from the alimentary canal.

SPIGELIA—PINKROOT.

Pinkroot is the ROOT of Spigelia Marilandica, or Carolina Pink (*Nat. Ord.* Spigeliaceæ), an herbaceous, indigenous plant, found chiefly in our Southern and Southwestern States. The root is perennial, and consists of a number of slender fibres; the stems are numerous, from a foot to a foot and a half high, of a purplish color, furnished with sessile, opposite, ovate-lanceolate leaves, and terminate in spikes, bearing carmine-colored, funnel-shaped flowers, which appear from May to July. The ROOT, as found in the shops, consists of numerous slender, wrinkled, branching, brownish fibres, attached to a dark-brown caudex, and has a faint peculiar smell, and a sweetish, slightly bitter taste; its activity is diminished by time. Boiling water extracts its virtues, which are thought to depend upon a *bitter principle;* it contains also volatile oil, resin, and other matters.

Effects and Uses.—In ordinary doses, pinkroot often proves anthelmintic without any sensible effect on the system. In larger doses, it purges and sometimes vomits; and, in excessive doses, it operates as a narcotic poison, producing vertigo, dilated pupils, convulsions, and death. It is less apt to occasion narcotic effects when it acts on the bowels, and hence it is usually combined with or followed by cathartics. As an anthelmintic, it is considered the most reliable article we possess.

Administration.—Dose of the *powdered root*, ʒi–ij, for an

adult; for a child three or four years old, gr. x–xx, to be repeated night and morning, for three or four days, and followed by a brisk cathartic; calomel is sometimes combined with it. The *infusion* is the usual form of administration (half a troyounce to boiling water Oj, with frequently senna

Fig. 26.

half a troyounce); dose f℥ss–j for a child two or three years old, f℥iv–viij for an adult, night and morning. The *fluid*

extract contains in a fluidounce a troyounce of spigelia—dose, for a child two years old, ten drops. *The fluid extract of Spigelia and Senna* (which contains also carbonate of potassa and the oils of caraway and anise), is a pleasant preparation; dose, f℥ss for an adult, f℥j for a child.

CHENOPODIUM—WORMSEED.

Wormseed is the FRUIT of Chenopodium anthelminticum, or

Fig. 27.

Jerusalem Oak (*Nat. Ord.* Chenopodiaceæ), an indigenous, herbaceous, perennial plant, from two to five feet high, with alternate, oblong-lanceolate, sinuated and toothed, yellowish-

green leaves, with numerous small flowers of the same color, arranged in long terminal panicles. Wormseed, as found in the shops, is in small spherical grains, not larger than a pin's head, of a dull, greenish-yellow or brownish color, a peculiar offensive smell, and a rather aromatic, pungent taste. Their sensible and medicinal properties are owing to a VOLATILE OIL (OLEUM CHENOPODII), obtained by distillation.

Effects and Uses.—Wormseed is a very efficient anthelmintic, particularly adapted to the expulsion of lumbrici from children. Dose, ℈i–ij for a child two or three years old, in molasses, night and morning, for three or four days, to be followed by a brisk cathartic. The *oil* is more used than the fruit; dose, gtt. v–x for a child, in emulsion with sugar. The expressed juice of the leaves, and a decoction made with milk, are also used.

SANTONICA.

The unexpanded FLOWERS and PEDUNCLES of Artemisia Contra and of other species of Artemisia, are used in Europe as an anthelmintic (in the dose of 10 to 30 grains), under the name of *European Wormseed.* They contain volatile oil, resin, and a peculiar principle, termed *Santonin—Santoninum.* This is the anthelmintic constituent of Santonica, and is much employed. Dose, 2 or 3 grains, two or three times a day, in the form of lozenge or syrup.

AZEDARACH.

This is the BARK of the ROOT of Melia Azedarach, or Pride of China (*Nat. Ord.* Meliaceæ), an Asiatic tree, cultivated extensively as an ornamental tree in our Southern States. It has a bitter, nauseous taste, and yields its virtues to boiling water; but, as it is used only in the recent state, it is not found in our shops. Its effects are said to resemble those of Spigelia. The *decoction* is the preferred form of administration,

(four troyounces to water Oij, boiled to Oj); dose for a child fʒss, every two or three hours, till it affects the stomach and bowels; or night and morning, for several days.

MUCUNA—COWHAGE.

The HAIRS of the PODS of Mucuna pruriens (*Nat. Ord.* Fabaceæ), a West Indian perennial climbing plant, act as an anthelmintic, by a mechanical penetration of the worms. The PODS are about four inches long, shaped like the Italic letter *f*, and are covered with brown BRISTLY HAIRS, which, when handled, stick in the fingers, and produce an intense itching. For *administration*, the pods are dipped into syrup or molasses, and the hairs scraped off with the liquid, which should have the consistence of thick honey. Dose, a tablespoonful for an adult, a teaspoonful for a child, night and morning, for several days, and followed by a cathartic.

FILIX MAS—MALE FERN.

Aspidium Filix Mas, or Male Fern (*Nat. Ord.* Filicales), is an indigenous plant, common to all parts of the world, with a perennial, horizontal root, from which spring numerous annual, oval, lanceolate, acute, bright-green pinnate fronds or leaves, from a foot to four feet in height; the leaflets are deeply lobate, oval, crenate at their edges, and gradually diminish from the base of the pinna to the apex. The RHIZOMA is the portion used. It is a long, cylindrical caudex, covered with the remains of the leaf-stalks; and, as found in the shops, it is generally broken into fragments, of a brown color externally, internally yellowish-white or reddish, with a peculiar feeble odor, and a sweetish, bitter, astringent, nauseous taste. It deteriorates by keeping. It contains volatile oil, fixed oil, resin, tannic and gallic acids, &c., &c. Its virtues are supposed to reside in the *ethereal extract*, which is the fixed oil in an impure state, containing volatile oil, resin, coloring matter, &c.

Effects and Uses.—Male fern possesses tonic and astringent properties; but its chief use is to cause the expulsion of tænia, which it destroys by a specific action. Its efficacy in this respect has been long and well attested. Dose, of the *powder*, ʒi–iij, in electuary or emulsion, night and morning, for one or two days; of the *ethereal extract*, gr. x–xx, repeated; and in both cases a cathartic is to be afterwards given.

GRANATI RADICIS CORTEX—BARK OF POMEGRANATE ROOT.

The BARK of the ROOT of Punica granatum (see p. 153), is used for the expulsion of tænia. It is a powerful styptic, and may act in this way. It is given in *decoction* (two troyounces to water Oij, boiled to Oj), dose, fʒij, or more.

OLEUM TEREBINTHINÆ (*Oil of Turpentine*), (see p. 261), is used as a remedy for tænia and other worms. Dose, fʒj, combined with or followed by castor oil.

CALOMEL (see p. 282), is a valuable anthelmintic, given in cathartic doses.

BRAYERA (*Koosso*). The FLOWERS and UNRIPE FRUIT of Brayera Anthelmintica (*Nat. Ord.* Rosaceæ), a native of Abyssinia, have been introduced into European practice, as a remedy for tænia, under the name of *koosso*. The dried flowers occur in unbroken, compressed clusters, of a greenish-yellow color, a fragrant balsamic odor, and a faint taste, which after a time becomes acrid and disagreeable. They are said to impart their virtues best to hot water, and to yield gum, resin, fatty matter, tannic acid, &c. They are best given upon an empty stomach, after a previous evacuation of the bowels, in the dose of half a troyounce of the *powder*, mixed with half a pint of warm water.

ROTTLERA—KAMEELA.

This is the POWDER and HAIRS, obtained from the capsules of Rottlera tinctoria, or, as it is now termed, Mallotus philippinensis (*Nat. Ord.* Euphorbiaceæ), a small tree of Hindostan and the East India islands. It is an orange-red, granular, inflammable powder, with little smell or taste, insoluble in cold, and nearly so in boiling water; soluble in boiling alcohol and ether. It consists chiefly of resinous substances, to one of which, soluble in ether, and considered the active constituent, the name of *rottlerin* has been given.

Uses.—*Kameela*, or *kamala*, is a highly esteemed tæniacide in India, and has lately been introduced into Europe and our own country. Dose of the *powder*, ʒi–ij. A tincture (six troyounces to alcohol Oj), is given in the dose of fʒi–iv. Castor oil should be taken after the medicine.

PEPO—PUMPKIN SEED.

The SEED of Cucurbita pepo, or common pumpkin, is probably the most efficacious remedy known in the expulsion of tapeworm. These seeds are oval, flattish, grooved, 9 lines long by 5 or 6 in breadth, of a light brownish-white color, a sweetish taste, and aromatic smell. They owe their activity to a principle, soluble in ether, chloroform, and especially alcohol. One or two troyounces of the *fresh seeds*, deprived of their outer envelope, beaten to a paste with finely powdered sugar, and diluted with water or milk, should be taken after a twenty-four hours' fast, and followed, in two or three hours, by a dose of castor oil. A fluid extract, made with alcohol and glycerin, is probably the best preparation.

APPENDIX.

SIGNS AND ABBREVIATIONS USED IN PRESCRIPTIONS.

℞, *Recipe*, take.
ā ā, *Ana*, (ava), of each.
℔, *Libra*, *libræ*, a pound, pounds.
℥, *Uncia*, *unciæ*, an ounce, ounces.
ʒ, *Drachma*, *drachmæ*, a drachm, drachms.
℈, *Scrupulus*, *scrupuli*, a scruple, scruples.
O, *Octarius*, *octarii*, a pint, pints.
f℥. *Fluiduncia*, *fluidunciæ*, a fluidounce, fluidounces.
fʒ, *Fluidrachma*, *fluidrachmæ*, a fluidrachm, fluidrachms.
♏, *Minimum*, *minima*, a minim, minims.

Ad 2 Vic., *Ad duas vices*, at two takings.
Ad Lib., *Ad libitum*.
Add., *Adde*, *Addantur*, add, let be added.
Altern. Horis, *Alternis horis*, every other hour.
Aq. Destil., *Aqua destillata*, distilled water.
Aq. Ferv., *Aqua fervens*, hot water.
Aq. Fluvial., *Aqua fluvialis*, river water.
Aq. Font., *Aqua fontana*, spring water.
Aq. Pluv., *Aqua pluvialis*, rain water.
Bis Ind., *Bis indies*, twice a day.
Bull., *Bulliat*, *Bulliant*, let it or them boil.
Cap., *Capiat*, *capiendum*, let the patient take it, it must be taken.
Chart., *Chartula*, *chartulæ*, a small paper, or papers.
Cochleat., *Cochleatim*, by spoonfuls.
Coch. Mag., *Cochleare magnum*, a tablespoonful.
Coch. Med., *Cochleare medium*, a desertspoonful.
Coch. Parv., *Cochleare parvum*, a teaspoonful.
Col., *Cola*, *coletur*, strain, let it be strained.
Collyr., *Collyrium*, an eye-water.
Comp., *Compositus*, compounded.
Cong., *Congius*, *congii*, a gallon, gallons.
C. M. S., *Cras mane sumendus*, to be taken to-morrow morning.
C. N., *Cras nocte*, to-morrow night.
Decot., *Decoctum*, a decoction.
De D. in D., *De die in diem*, from day to day.

Dieb. Alter., *Diebus Alternis*, every other day.
Dil., *Dilue, dilutus*, dilute, diluted.
Dim., *Dimidius*, one-half.
Div., *Divide*, divide.
D., *Doses*, a dose.
Elec., *Electuarium*, an electuary.
Enem., *Enema, enemata*, a clyster, clysters.
Exhib., *Exhibeatur*, let it be administered.
F. H., *Fiat haustus*, let a draught be made.
Fil., *Filtra*, filter.
Ft., *Fiat, fiant*, let there be made.
Garg., *Gargarysma*, a gargle.
Gr., *Granum, grana*, a grain, grains.
Gtt., *Gutta, guttæ*, a drop, drops.
Guttat., *Guttatim*, by drops.
Haust., *Haustus*, a draught.
Ind., *Indies*, daily.
Inf., *Infunde*, pour in.
Infus., *Infusum*, an infusion.
Inj., *Injiciatur*, let it be injected.
Jul., *Julepus, julepum*, a julep.
M., *Misce*, mix.
Mane, in the morning.
Mist., *Mistura*, a mixture.
Mic. Pan., *Mica panis*, crumb of bread.
No., *Numero*, in number.
Omn. Hor., *Omni horâ*, every hour.
Omn. Bid., *Omni biduo*, every two days.
Omn. Bih., *Omni bihorâ*, every two hours.
Omn. Man., *Omni mane*, every morning.
Omn. Nocte, *Omni nocte*, every night.
Omn. Quadr. Hor., *Omni quadrante horæ*, every quarter of an hour.
Ph., Pharmacopœia.
Pocul., *Poculum*, a cup.
P. R. N., *Pro re natâ*, as the symptoms may call for.
Pulv., *Pulvis*, a powder.
Q. P., *Quantum placeat*, as much as you please.
Q. S., *Quantum sufficiat*, enough.
Quor., *Quorum*, of which.
Redig. in Pulv., *Redigatur in pulverem*, let it be reduced to powder.
Repet., *Repetatur, repetantur*, let it or them be repeated.
S., *Signa*, write.
S. A., *Secundum artem*, according to art.
Semih., *Semihora*, half an hour.
Sign., *Signatura*, a label.
Ss., *Semis*, a half.
Sum., *Sume, sumendus*, take, let it be taken.
Tabel., *Tabella*, a lozenge.
Troch., *Trochiscus*, a lozenge.
Trit., *Tritura*, triturate.

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